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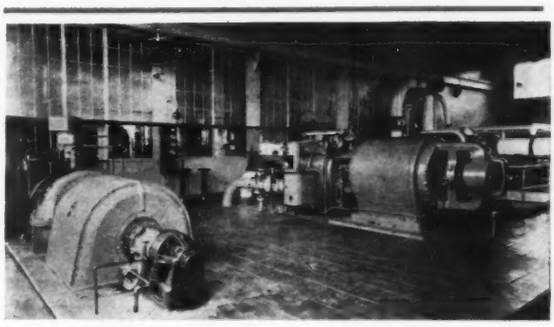

Jeddo-Highland power plant: see p. 46

- **Statistically speaking,** dear old 1938 may not have been so hot. In the light of general industrial conditions last year, however, tonnage declines are much less significant than the progress made by coal in other directions. So the technical achievements of 1938 and what they point to for the future will be featured next month in our 28th Annual Review and Progress Number.

- **Rock-dusting** has done a grand job in reducing major explosions. But its benefits do not end there. Increased visibility, which in turn helps to eliminate accidents, also follows adequate rock-dusting. This phase of a double-barreled contribution to safety is given verbal and visual demonstration in the text and pictures of the article by an Illinois mining executive on page 32.

- **Should rock work** be performed by the regular mine organization or by an independent contractor? Who is to blame for high contract costs for such work? What are the handicaps on speed in tunnel driving in coal mines? Ben Lubelsky handles these and related questions without gloves in an article on rock developments in anthracite, scheduled for publication in an early issue.

- **Changed mining conditions,** including a reduction in working height from 8 to 3 ft., are being met successfully at Logan Chilton Coal Co. by the use of shaker conveyors and a mother belt. Adoption of angle-face instead of straight-face rooms has halved shaker-conveyor moving costs. Jack Edwards tells the story of this operation in the article starting on page 27.

- **Maintenance men** and brass hats interested in more efficient methods should find the story of the new Berwind-White electrical repair shop a tale to their taste. Special armature-handling racks and trucks, an improved baking oven and a sealed receiving and cleaning room are among the features which make this shop outstanding. Shop, layout and equipment will be described in the March issue.

- **What** is to become of older men scrapped by industry? Long before a Social Security law was on the statute books coal mines answered that question by keeping such men at work and, as years took their toll, finding easier tasks for them to do. And, as the anthracite story on page 36—third in our public-relations series—shows, they're still doing it.

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COAL AGE

Established 1911—McGraw-Hill Publishing Company, Inc.

DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

SYDNEY A. HALE, *Editor*

January, 1939

Pertinent and Impertinent

• SECRETARY ICKES raised a pertinent question in opening the conference on coal-mining safety and health at Washington last month. Quoting records of the Bureau of Mines, he wanted to know why, if 57 per cent of the bituminous mines could operate a full year without a fatality, all mines could not do likewise. He said he didn't know the answer, but looked to the coal industry for enlightment. And answers, not alibis, are needed if continued improvement in safety is to be maintained. Perfection may be unattainable, but the figures certainly put the 43 per centers in a hot spotlight.

• "KEEPING UP with the Joneses" is more than a comic strip. It is an expression of a definite widespread buying influence. For that reason the recent achievements of anthracite in inducing commercial builders of home blocks in Virginia and Illinois to equip these dwellings with stokers instead of oil or gas burners is a ten strike. Coal can be made fashionable in its velvet markets and give a real challenge to snooty oil and gas.

• QUITE A POINT has been made of the spread—in the wrong direction—between average bituminous costs and average realizations the past two years. Using figures introduced by Dr. W. H. Young in the freight-rate case last fall, National Coal estimates 1937 losses at $49,000,000 and 1938 around $75,000,000. Not a happy showing, but also not the whole story. The estimates are based on average costs of $2.077 and average realizations of $1.963 for the last nine months of 1937 for companies reporting to the National Bituminous Coal Commission. During that period mechanized deep mines in Illinois had an average total cost of $1.746 per ton; strippers, $1.432; Indiana mechanized deep mines, $1.764; strippers, $1.463; Southwestern strippers, $1.823. Average costs for hand-loading mines in the three districts were $2.179, $1.957 and $2.622, respectively. Need we draw a diagram?

• NOT SO LONG AGO candidates for political preferment were declaiming against invisible government. If recent demonstrations of the United Mine Workers are any criterion, hidden forces have been licked and the strings now are pulled in public. A. D. Lewis adds another chapter to the tale of frankness unalloyed when he declares the safety conference called by Secretary Ickes not in accordance with the expressed wish of the union or the promise of President Roosevelt and leads the successful movement for abandonment in favor of a later meeting organized more in sympathy with labor's ideas. Nothing "invisible" about that.

• CONGRATULATIONS to National Coal on the start of its 1939 advertising campaign to consumers and architects. Congratulations, too, on the continued emphasis on stoker-fired installations for the home. These campaigns, like those of Anthracite Industries, Inc., not only carry a significant direct message to the reader but an equally important indirect one. That is confidence and pride in solid fuel. People may buy from you without that, but you can't sell them.

"Not Our Baby"

BECAUSE the immediate plight of the railroads seems desperate, indefinite extension of rates which jeopardize their future earning powers has been authorized. That is the nub of the recent Interstate Commerce Commission decision wiping out the time limitation on temporary increases on bituminous coal approved late in 1937. The railroads, says the Commission, need the money; the coal consumer should be a good boy and continue to kick in. If, as many suspect, coal already is paying more than its share of the transportation bill, that suspicion does not sully the Commission's conclusions.

No one, however, can justly accuse the Commission of academic disregard of long-term unfavorable reactions to higher coal rates. Doubts as to the wisdom of such increases were voiced in the 1937 decision. These doubts are expressed with increasing conviction in the latest pronouncement. Competition in the national energy market promises to grow keener. Some consumers, the Commission opines, have been deterred in part from taking steps to remove "their dependence on rail transportation of bituminous coal" by the nominally temporary status of most

increases allowed since 1931. "Approval of the present rates for indefinite continuance may serve to hasten such steps."

Here is a situation which "challenges the serious consideration of all who have a stake in the well-being either of railroad transportation or the coal industry." But not, apparently, the Interstate Commerce Commission. Having neatly stated the problem, that august tribunal falls back upon "the present level of railroad expenses and taxes" as justification for making temporary increases permanent. If these rates result in a further shrinkage of rail-borne coal tonnage and railroad income, it can point to its twice-written recital of doubts. All of which might be a flattering tribute to foresight, but hardly helpful in forestalling losses to both railroads and coal mines.

Write Your Own Ticket

As the time for Appalachian wage negotiations draws near, certain facts and probabilities warranting cold-blooded appraisal emerge. Should the customary preliminaries be observed, union spokesmen will enter the conference March 14 demanding a substantial increase over rates in the expiring contracts; the operators' committee will counter with a demand for a reduction—possibly down to the 1936 scale. Mechanization, sidetracked two years ago to a joint commission of operators and miners who since have largely traveled separate paths, probably will be made a juicy bone of contention. Whether the union will press some still unnoised demand as it did overtime pay in 1937 is any man's guess.

That the union would like to wangle an increase and the operators would be in a happy daze if they came out of the conference with a lower wage scale needs no argument. But desires and sober expectations are not always synonymous. Appalachian producers bent on holding out for a decrease might find themselves whipsawed by stand-off agreements in districts outside their region. Since Mr. Lewis' organization also has its own competitive problem in the Progressives, his group, too, must reckon with imperiling its future by trying to reach for the moon.

Under such circumstances, it would not be surprising if the union representatives should forego some of the pleasantries of shadow boxing and open the conference with a proposal to renew the existing agreements. From the standpoint of public relations, this would be a smart move for the union—and Mr. Lewis and his associates are not dumb. Such a proposal undoubtedly would appeal to many operators in competing fields who still remember the days when their Appalachian brethren were selling coal while they were strike-bound.

Attempts to penalize the mechanized mines in a new agreement might conceivably win the support of some backward operators, but labor would be the chief sufferer if success crowned such endeavors. Mechanization is a bulwark for the maintenance of adequate wage rates; its unhampered development alone will enable the industry to hold present ground and recover lost territory. Penalization would play into the hands of coal's competitors. So, too, would a real suspension.

Forgotten Tomorrow

Coal, unfortunately, never has been a generous supporter of research. Where some industries have invested millions, coal has been reluctant to risk thousands. Now even its modest contribution is threatened with further curtailment. For the past six months the work carried on for Bituminous Coal Research, Inc., by Battelle Memorial Institute has been limping along on an uncertain and temporary financial basis. Unless there should have been a still unpublicized last-minute change, that program, initiated in 1935, came to a period with the close of the year.

An easy explanation of this termination might be found in the slim pocketbooks of many mining companies. But that answer oversimplifies the problem. Moreover, to the extent that it may be a valid excuse it impugns the sound judgment of those who use it. No one stands more in need of a doctor than a sick man. Research is a tonic for ailing industries. Coal, however, cannot play the pauper and expect its competitors to endow a free clinic for it—unless it be to furnish the theater for an autopsy.

Discount the poverty plea; it is spurious. The real explanation does not lie in the bottom of a mendicant's tin cup. What hampers promotion of research in the bituminous coal industry is primarily a compound of indifference, ignorance and lazy, wishful thinking. Many executives are indifferent simply because they have not been sold; research has been "just one of those things," instead of something of first-rate importance to the future of their companies. Others have soured because research has not delivered new profits in a holiday package a few months after their modest initial investment.

Lazy, wishful thinking probably offers the greatest handicap to an active long-term, long-range research program. Too many lost in this type of dreaming are pinning their hope for future prosperity on the financial demise of their competitors within the industry and the natural exhaustion of oil and gas reserves. Well, the imminent exhaustion of oil resources has been predicted for years and oil competition probably never was stronger than today. The renascence of natural gas since 1929 has given more than one coal producer a headache.

Research can and has helped in the solution of competitive problems. It has greatly enlarged our fundamental knowledge of coal and coal-burning characteristics. That knowledge, however, is still far from complete or adequate. Research, too, holds out the only solid hope of finding new fuel and non-fuel uses for coal. In short, it can be coal's advance agent penetrating tomorrow's markets. No industry can afford to forget tomorrow lest tomorrow pass it by.

BELT AND SHAKERS

+ Meet Changed Mining Conditions

At Leckie Mine in Logan County

• At Rita mine, in Logan County, West Virginia, all development and recovery mining is now being done with shaker conveyors and a mother belt. A new condition which presents a working height of 36 in. instead of 8 ft. is being met successfully with the conveyor equipment. By changing from straight-face to angle-face rooms, the shaker-conveyor moving cost was cut in half. Steel jacks are used as safety posts. Hanging the belt from the roof with clearance underneath for empty cars has solved a loading problem in advancing the main entry.

By J. H. EDWARDS
Associate Editor, Coal Age

RITA mine, of the Logan-Chilton Coal Co., one of seven operations of the Leckie interests, is situated on the Guyandotte River 10 miles above Logan. The tipple, which loads to the Chesapeake & Ohio Ry., is on one side of the river and the headhouse and drift portal on the other. A Leschen two-bucket reversing motor-driven aerial tram having 2¼-in. track ropes and ⅝-in. haulage and tail ropes carries the coal from the drift portal to the tipple. Bucket capacity is 3½ tons, the travel is 511 ft., and the tram capacity is 100 tons per hour. Elevations are such that the loaded bucket will drift by gravity to about the middle of the tramway and from there on must be pulled by the 25-hp. drive motor.

The first shaker units of the present equipment, which is of Goodman manufacture, were installed in October, 1936, but the experience with shaker conveyors dates back to 1927, when in another seam 180 ft. above the present mining two 300-ft. Eickhoff shakers with wide-mouth scoops were put into use (*Coal Age*, p. 487, August, 1929). After several years of operation those conveyors were moved to another Leckie mine and in 1936 the Rita headhouse and drop-bottom-car bin (containing 100 tons of coal at the time) were destroyed by fire. This brought a decision to abandon mining in the upper seam and rebuild at the lower seam, which is a coal suitable for the byproduct markets.

Mining had been carried on in this lower seam for several years by the predecessor, the Guyan Mining Co., which, however, did most of its mining in the upper seam and terminated its operations when an earlier fire (1924) destroyed the first tipple and a suspended belt-conveyor system which then spanned the river and delivered from both seams. The property was purchased by the Leckie interests in 1926 and in that year the present tipple and the first aerial tram were built.

In rebuilding after the 1936 fire, end-dump steel cars were adopted. The new headhouse is a compact structure with the kick-back dump situated within 40 ft. of the mine portal. The dump-bin capacity is 20 tons. Of the 44 cars that comprise the haulage equipment, 20 are Watt stub-axle type, 26 in. high with rated level capacity of 3½ tons, and 24 are S-D Whoppers, 28 in. high and level capacity of 4.2 tons. In the present conveyor mining, where all cars are loaded from the belt, the average for both types is approximately 4 tons.

At the portal and for a few hundred feet, the seam thickness is 56 in. and the coal is divided by a 2- to 4-in. band of slate situated 36 in.

In driving main entry the conveyor belt is parallel to the track.

Lamps in background are at head of belt which is loading this trip.

from the bottom. Further development revealed a slate-band increase reaching a maximum of 48 in. Encountering that condition caused the original company to abandon work in the seam. The Leckie interests decided to mine only the 36-in. bottom bench. On an irregular line which intersects the main haulway 2,200 ft. from the portal (Fig. 1), both the slate parting and the 17-in. top bench disappear in a horizontal distance of 40 ft. and the 36-in. bottom bench has a strong sandstone top. The bottom is a hard slate except that in some places 1 to 2 in. of fireclay occurs between it and the coal.

The new condition prevails uniformly for the 1,100 ft. that the main-haulage heading has been driven from the change or pinch-out line and it was in this sandstone top territory that the shakers were in operation on development work (belt set-up *B*, Fig. 1) when observed by the writer. Position of the belt when first installed in April, 1938, is designated by *A*. On the same drawing, *C* indicates the position to which the belt was to be moved soon after this writing. Here, as it was in the territory *A*, the mining will be under the heavy slate band. Maximum and minimum coal thicknesses being encountered are 42 in. and 28 in.

Eleven hundred acres is available to the mine. Prospect holes on the opposite side of the mountain 1½ miles from the portal as measured on the line of main haulage projection indicate that the 36 in. of coal with sandstone top persists throughout the territory. Cover ranges up to 600 ft. As an average the seam dips 3 per cent and the local grades are not severe. These conditions plus a dry mine influenced the decision to use the shaker type of room conveyor. Ease of moving and lower investment were the other considerations. Use of a swivel and a slide-up pan in the working place makes it unnecessary to embody the complication of a face conveyor.

Four shaker conveyors working in rooms and delivering to the mother belt is the normal set-up but in certain cases of main entry development —for instance, *B* on the drawing— one shaker is used as a mother for a room conveyor and thus only three face crews are employed. Tonnage delivered to the main haul per man-shift is 13.2 for normal room work with four shakers. The mine is operated two shifts and the total daily production averages 450 tons. Tonnage per man inside, including the mine foreman and night boss, is 10.9, and the production per man, including tipple crew and all employees except the office and commissary help and the superintendent, is 9.3. In development work 10 tons per man is the representative efficiency of delivery to the main haul.

The four shakers are Goodman Type G12½ non-reversing and they are driven by 10-hp. 250-volt d.c.

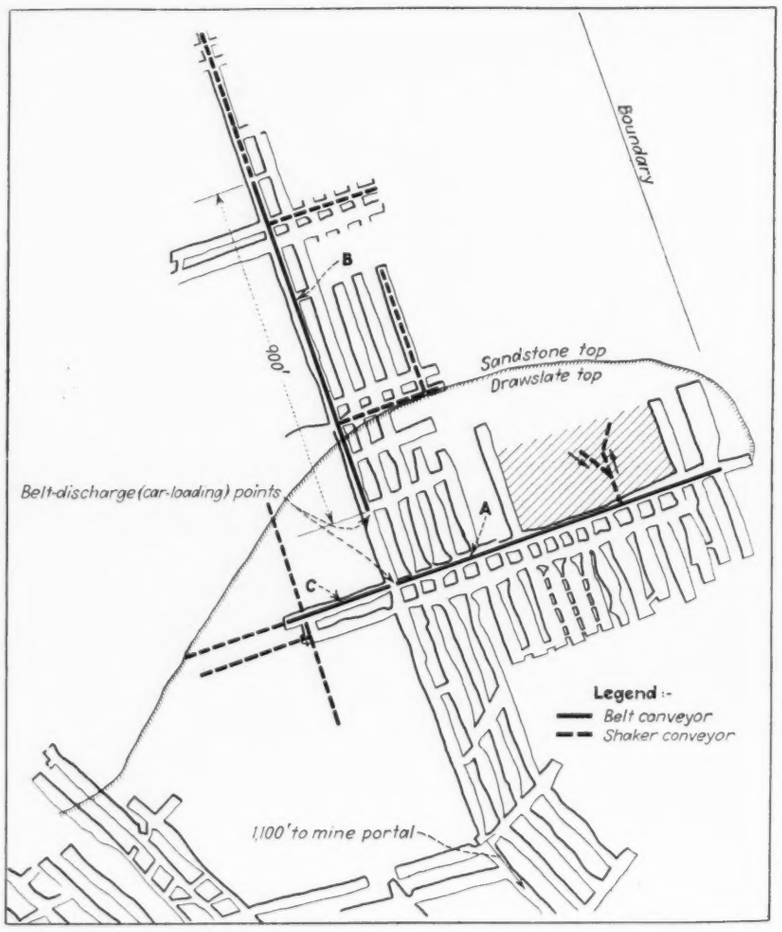


Fig. 1—Showing the first, second and third set-ups (A, B and C) of the belt and shakers.

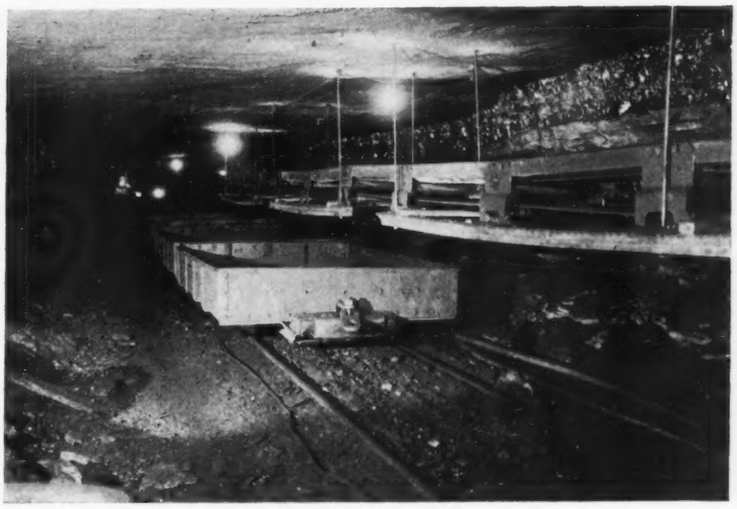
motors. Pans are No. 1 (10 ft. 2 in. long x 18 in. wide; weight, 198 lb.) and they are joined by two non-turning bolts. The cradles are the ball-bearing type and in no case are roof suspensions used for these conveyors. Equipment with each conveyor consists of 30 No. 1 pans, a 30-deg. swivel and one 12-ft. slide-up pan. The company also owns one 90-deg. swivel, but it is not in regular use because, as compared to the 30-deg. type, it has disadvantages of greater weight and of requiring stronger anchorage. The 30-deg. type does very well inasmuch as it allows a choice of working straight-faced rooms as wide as 50 ft. or angle-faced rooms with face length of at least 70 ft. Three of the shakers were put into use in October, 1936, and the fourth in March, 1937.

The mother conveyor, which is 900 ft. long and operates at 150 f.p.m., is the new Goodman flat-belt type, style No. 95A20. Its drive is a 10-hp. 250-volt totally inclosed d.c. motor and the carrier is a Goodyear 20-in. 5-ply 32-oz. belt. Top idlers are spaced 5 ft. apart and the bottom idlers 10 ft. Side plates which guide the belt and prevent coal spillage constitute the frame extending between idler stands. Idlers and side plates are assembled to the stands by fixed pins that fit into slots; therefore no tools for this purpose need to be provided.

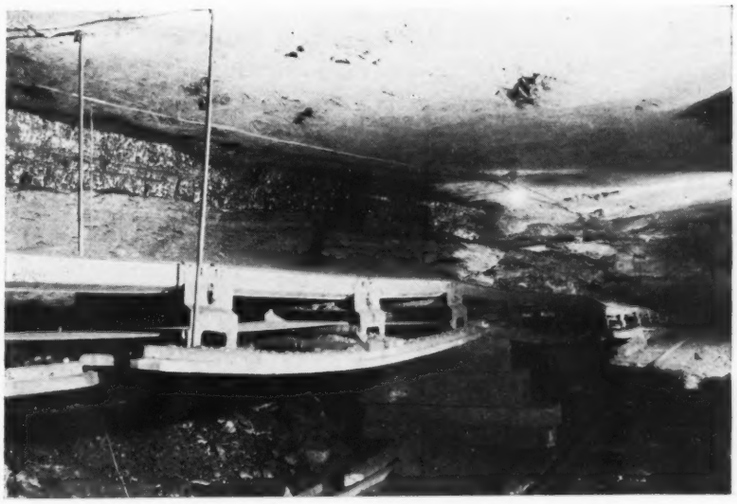
Face Equipment Used

Cutting equipment consists of six Goodman Type 12AA 50-hp. short-wall machines, two of which serve as spares. Bars are 7 ft. long; standard chains and bits are used and the sharpening is done by hand-forging and quenching. Drilling is done with three Jeffrey A-7 and two Little Giant No. 472 drills, four of which are regularly in use. They are equipped with augers using McLaughlin No. 4C spiral taper bits. Auxiliary ventilation is supplied by four Jeffrey blowers each equipped with 300 ft. of Dupont No. 1 Ventube. Twelve 7-ton "Simplex Safety Speed Mine Roof Jacks," three used in each room, serve regularly instead of safety posts. Thirty inches to 42 in. is the range of extension of these jacks.

The main haulage, which is now only 2,100 ft., is done by one 6-ton Goodman trolley locomotive pulling trips of eight and sometimes nine cars. At present 30-lb. steel is used on the main haulway. Another locomotive, a General Electric 6-ton, is used for shifting cars at the belt delivery point. This locomotive is used

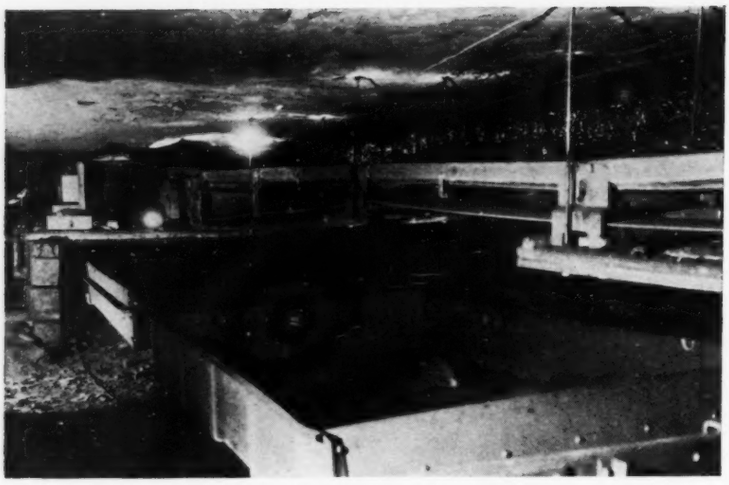


View looking outby on main hallway where the belt is suspended from roof.



Looking inby where the belt support is changed from roof to floor. Note the thick slate parting under the 17-in. bench of top coal.

Shaker delivering to the belt over the tail pulley.



Looking outby at the head of the belt.

A 30-deg. swivel and 12-ft. slide-up pan are used on the shaker for driving 25-ft. heading. Note the three screw jacks serving as safety posts. The man at the extreme left is at the controls of the cutting machine.

An aerial tram spanning the Guyandotte River transports the coal from headhouse to tipple.

without motorman, with brakes partially set and the controller on second point. The car trimmer starts and stops it by switching the power to and from a section of trolley wire.

Undercutting is done 3 to 4 in. above the bottom and this insures that the cuttings which are loaded with the coal will be clean. The bottom is scrapped and loaded as the final step in cleaning up a cut. Shooting is done on the loading shift with Dupont Monobel E, $1\frac{1}{8}$-in. sticks, 252 per case. Breaker holes are loaded with $1\frac{1}{2}$ sticks and the other holes with one stick each. Hole spacing is 6 ft. In the workings under the slate top the holes are drilled straight in and about midway of the seam height so as to avoid weakening the roof. Under the sandstone top they are started higher up and pitched to position the charge near the roof.

Headings are driven 25 to 30 ft. wide on 60-ft. centers. Two headings constitute the cross entries, but, in order to provide sufficient airway section, five headings are driven to form the main entry. Top will be taken on one to provide height for haulage from the advancing belt-discharge positions.

Doubling Tonnage per Move

Previous to mining the area indicated by the shading on Fig. 1, rooms had been driven for the most part with face lines square with the room centers. In the shaded area the rooms were advanced with the shaker conveyor positioned at the left side and with the loading section of the conveyor set at an angle which provided a face 60 to 70 ft. long. At room depth limit the conveyor nose was swung in an arc and to the other side to mine a 60- to 70-ft. face on retreat. Rooms were driven on 90-ft. centers, and small pillars, sometimes cut through in places, were left between rooms.

Due to the success with this angle-faced method in the area mentioned, it is the intention to continue to mine by that method if top conditions will permit. As compared to advancing a square face and with the conveyor in the center of the room, it produces twice as much coal per move of conveyor drive. Each move costs $28 to $30.

Timbering is done with split posts of 8- to 10-in. face. In the rooms under the slate the posts are set on 4-ft. centers both ways, but under the sandstone the spacing is increased. In the 25-ft. headings two rows are placed parallel to the center line and the individual post spacing

is 6 ft. A clear aisle of 4 ft. is left open between pan line and posts for moving mining machines and handling supplies.

Inside views shown were photographed at the entry driving set-up *B*. Haulway height for several hundred feet approaching the roof change line was 8½ ft. and a 175-ft. length of the belt conveyor at the discharge end was in this high entry and the rest in the 36-in. height. Outby of the low top, the conveyor is elevated gradually to a position above the track so that a trip of nine empty cars to be loaded can be backed under it. At the next set-up, *C*, on the cross entry, it will be elevated only at the discharge end and there, with the empty track extending 350 ft. inby of the loading point, twenty-car trips will be loaded.

Conveyor Hung From Roof

In the present position, 125 ft. of the belt conveyor is hung from the roof by pairs of ⅝-in. rods at 5-ft. and 10-ft. intervals. The rods support side sills consisting of two 2x4's lying flat one above the other. Holes in the roof were drilled with a jackhammer and the ⅝-in. rods are anchored therein by use of trolley-hanger expansion shells and wedges.

After the belt conveyor has been removed from set-up *B* and while it it is working the outby panels, sandstone top to the extent of 36 in. will be taken along the center of the main heading to provide height for haulage. The heading being 25 ft. wide, it is expected that most of the rock will be gobbed along the ribs.

One crew leader, two loaders and one machine runner comprise the crew for each of the four shaker conveyors. On the first, or day, shift, five additional men are regularly in the mine, making a total of 21 inside men. These five are the car trimmer, motorman, brakeman, supply man and the mine foreman. The second-shift crew is the same except that no supply man is employed and a night boss is on duty instead of the mine foreman. Thus, adding the two shifts, inside labor amounts to 41 man-shifts per day except that as a rule the supply man works but three shifts for each five days or ten loading shifts. Normal average production per day of two shifts from room mining is 450 tons.

The following men work on the outside: one aerial tram bucket runner, one electrician and mechanic who also does the bit sharpening, one lamp man and four tipple men. Thus the total of employees, not including the superintendent and the office and commissary help, is 48. Closed lights only are allowed in the mine and a no-smoking rule is strictly enforced.

Electrical control and feeder system for the belt drive, shaker units, mining machines and drills follows a simple plan which allows maximum flexibility with a minimum of wiring. D.c. power is generated by a 150-kw. converter in an outside substation which contains two such units. The car trimmer has at his station a reversing and speed-controlling drum switch to control the belt and a pushbutton by which he can open and close a magnetic switch feeding the shaker units through a No. 4 insulated positive line. A separate 4/0 wire constitutes the positive line along the cross entry for feeding mining machines and drills. Another No. 4/0 wire serves as the return line for both shakers and face machines.

The face crew has control of the shaker drive by means of a portable pushbutton station that is on the end of a 300-ft. three-conductor cord which is handled on a small reel that is moved forward with the face equipment. An Ohio Brass fused nip is used on the end of the mining-machine trailing cable where it is attached to the 4/0 feeder on the heading. A special plug-type junction block is used in the trailing cable within 25 ft. of the machine to provide for disconnecting in case of insulation breakdown or if the cable is to be moved to the opposite side of a prop.

Power is purchased and the requirement was 4.01 kw.-hr. per ton in May and June, 1938, during which time the entire production of 11,075 tons was loaded over the belt and the running time was somewhat better than during the next few months. In contrast, during the year 1937, when the belt was not yet in service and in addition to the haulage locomotive others were used at the shaker heads, the power consumption amounted to 6.16 kw.-hr. per ton. During that year the average monthly production was 5,057 tons; the power cost, 11.82c. per ton; and the cost per kilowatt-hour, 1.9c., including demand charge.

The tipple, which contains Morrow equipment, has apron-type loading booms on two of the three tracks. Sizes regularly loaded are 5-in. lump, 5x2-in. egg and 2x0-in. slack. The markets are domestic, steam and byproduct.

W. S. Leckie, of Columbus, Ohio, is president of the company; L. W. Helmintoller, of Bluefield, W. Va., is general superintendent, and W. W. Coleman, of Aflex, Ky., is chief engineer. At the Rita mine, H. C. Weaver is superintendent; Burke Johnson, mine foreman, and Harmon Lockhart, mine electrician.

Looking inby along the belt. Here in a horizontal distance of 40 ft. the slate parting and 17-in. top coal pinch out. In the background at the right is a shaker delivering to the belt.

VISIBILITY INCREASED

+ And Accident Hazards Reduced

By Mine Rock-Dusting Program

ROCK-DUSTING to reduce explosion hazards has thoroughly proved its efficacy in many coal mines and has prevented many major disasters. That, however, is not the whole story. As the text and pictures which follow, describing a study made at an Illinois operation, show, rock-dusting also yields a valuable byproduct in increased visibility in workings where such visibility is sadly needed. And that increased visibility also can contribute to a reduction in injuries and fatalities.

The mine in which the originals of the illustrations that follow were made is a gaseous operation. It has for many years used ground white limestone dust as a protection against the explosion hazard. Last summer it was decided to cover the entire mine with a fresh coat regardless of the routine dusting done in various parts at various times in the past. On an inspection trip, the writer, in passing from an area dusted some months before to an area which had been dusted just a few days before, was much impressed with the extreme difference in visibility between the two sections.

At this mine a man had been killed some time before when he jumped off a moving trip to avoid what he evidently believed was a certain pile-up arising from a fall of roof on the haulageway between in and out trips. His death occurred because long-distance visibility was poor. This mine is perhaps no better nor worse lighted in its main haulageways than any other large mine. It has ordinary 250-volt lights which are hooked between the trolley and rail at irregular intervals of 150 ft. to perhaps 300 ft. The contrast between the visibility in the old and new dusted areas was so marked as to prompt the writer to attempt to record this contrast because he believed that perhaps by such a record more emphasis might be placed on the safety factor of rock-dusting from a visibility standpoint in addition to its explosion-hazard protection. After the photographic experiments, the results of which follow, the writer is more than ever convinced that in all haulageways rock-dusting is a good investment from a visibility standpoint whether or not gas is present.

In making the photographic study, it was assumed that a fair measure of the difference in visibility in any given entry at any particular location could be obtained by taking pictures with the same camera before and after rock-dusting, using the same stop opening, the same film, the same distance setting, the same entry lighting (which, incidentally, is the normal entry lighting always in use, as described above) and the same time exposures, being particular to place the camera as nearly as possible in identical locations on both occasions. An Eastman 616 kodak taking a $2\frac{1}{4}$x $4\frac{1}{4}$-in. picture was loaded with Verichrome film and the opening was set at f16 and the distance at 25 ft. A spot was selected immediately below one of the ordinary entry lights and several time exposures were taken because of a lack of knowledge of the necessary time required. Exposures of one minute, two minutes three minutes, five minutes, ten minutes and twenty minutes were tried.

Out of this experience several things were learned; first, that time exposures below twenty minutes were not sufficient under the prevailing light intensities; second, that we must cover the lights far down the entry which happen to shine in the camera lens. The camera was located by laying two square crossties about a tie length apart across the rails, laying another one along the track on top of these two ties and setting the kodak on the end of the top tie after determining that it was solid and not subject to vibration.

The first location was on a long passing track in which the rock-dusting was old—in places rashed off and throughout the entire area pretty well blackened with coal dust. The results are set forth in Fig. 1, not as examples of good photography but as indicative of the experience by which we profited. After this entry had been rock-dusted the camera was brought back to within inches of the same location. In other words, it was set exactly as before, after which the same time exposures were

Watch Your Step!

This revealing study—one of the most interesting that ever have come to the editorial desk—really should be published as a signed article. Only the insistence of its modest author-photographer, executive of a prominent Illinois coal-mining company, stops us. So the article must be left to speak for itself—and it can and does, despite the anonymity. Although space limitations compelled the elimination of a few pictures, the omissions have been in-between shots so that the final comparative values are preserved. "If anybody calls you a liar about these pictures," writes the author, "you can refer him to 'your special representative' in this field, who will be glad to demonstrate by films and witnesses that the subject matter is all as represented by you." Knowing the author as we do, we'd hate to take up this defi.

Fig. 1—Before rock-dusting in the East passing track (exposures, left to right, of 1, 10 and 20 minutes).

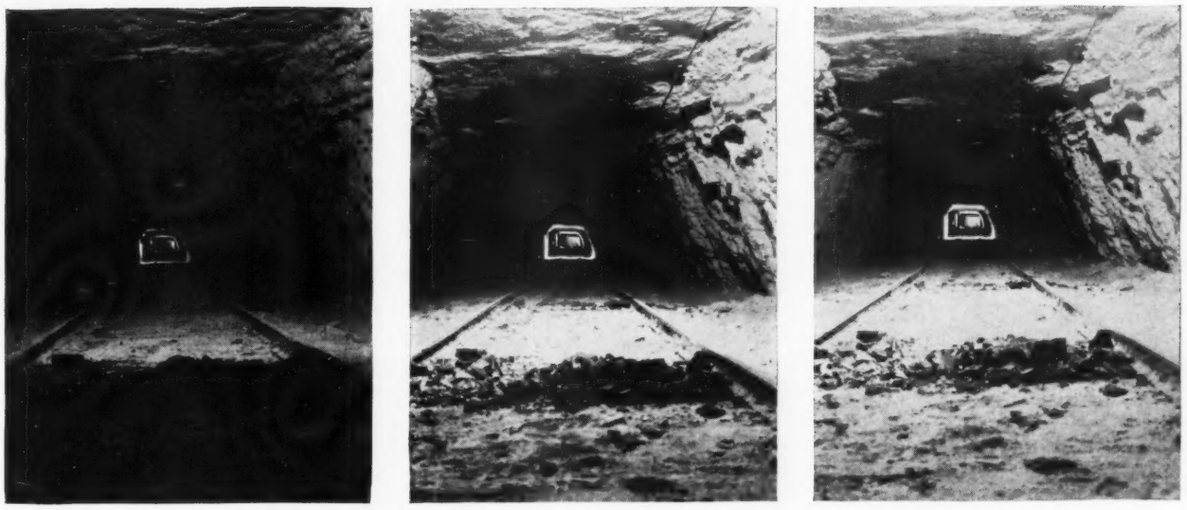


Fig. 2—After rock-dusting in the East passing track—same exposures and same lighting and other conditions as in Fig. 1—showing increase in visibility.

made, resulting in the difference in visibility, as compared with the previous exposures (Fig. 1), indicated by the photographs comprising the illustrations in Fig. 2.

It will be observed that with an exposure of one minute after rock-dusting was applied the picture was better and indicated more visibility than an exposure of twenty minutes before rock-dusting. It is the writer's belief that the nearest to what the eye sees is expressed by the twenty-minute exposure before rock-dusting compared with the ten-minute exposure after rock-dusting. Purely as a matter of interest and having nothing to do with the subject being studied, two other pictures (Fig. 3) were taken with the same setting at the same time as the pictures in Fig. 2, the only difference being that we

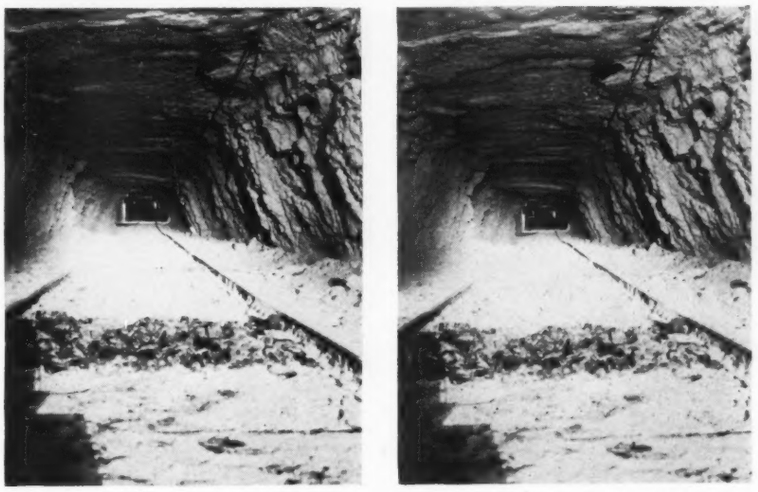


Fig. 3—East passing track after rock-dusting, with the locomotive headlight on (exposures of 2 and 4 minutes).

turned on the headlight of the motor which stood behind us. This shows the appearance of the entry after fresh rock-dusting, with the motor headlight on (exposures of two and four minutes).

Out of this first experience we concluded that we must take extreme care to shade the lights along the entry from the lens of the camera. This was accomplished by hanging a heavy piece of cardboard just back of the light when pictures were taken before or after rock-dusting. Another conclusion we reached was that we should get a result more nearly approaching what the eye sees if we set the camera midway between two lights in an entry rather than immediately under any one light. It will be observed that the face of the coal and the roof are unduly bright in the longer exposures after rock-dusting because we were too close to an entry light.

Our next location, profiting from our first trial, gives us what the writer believes are results more nearly approaching what the eye actually sees and what the difference is in visibility between old rock-dusting and fresh rock-dusting. These pictures were in a very dark entry looking slightly upgrade on a road north from the main shaft. The entry was so dark that no appreciable results were obtained before rock-dusting on any time exposure less than 30 minutes, although they were taken, as a matter of fact, from two minutes up. The result is shown in Fig. 4. On our return after this entry had been dusted we got what we believe definitely expresses the difference due to rock-dusting, as shown in Fig. 5.

The writer has personally checked the details shown on 30-minute exposure after dusting (Fig. 5) and the detail of the overhead timbers in this picture is just as nearly as we can judge what the eye sees. It will be noted the entry was practically dead black before rock-dusting except for the spots of light shown in 30-minute picture taken before dusting. The exposures after rock-dusting reproduced in Fig. 5 (same location, same camera setting and same film) give a clear idea of the extreme visibility and the pictures have what looks to be extraordinary depth. The shadow of the camera at the end of the tie on which it sits can be seen in pictures taken at this location after dusting. In all of these pictures taken in the entry looking north, Agfa Superpan film was used because of the intense blackness of the entry before dusting, but we followed our standard plan of using the same film and the same exposures before and after dusting to get what we hoped was a true contrast of visibility.

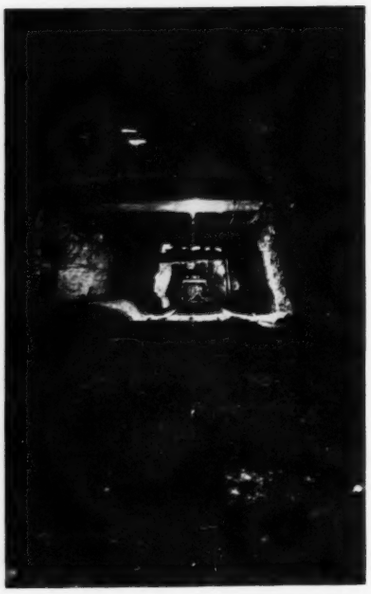


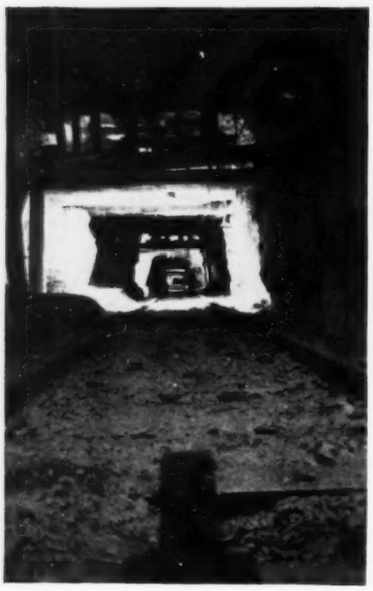
Fig. 4—Thirty-minute exposure in the Main North near the main shaft before rock-dusting. No usable results were obtained with shorter exposures.

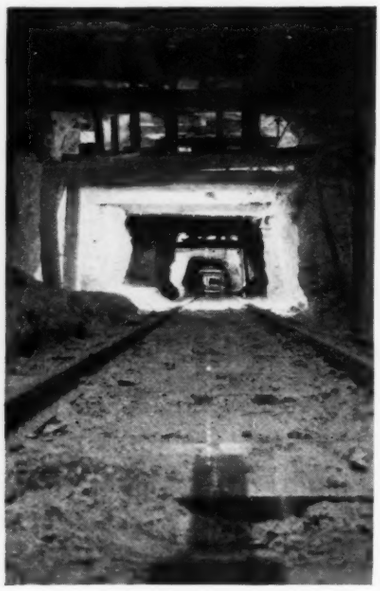
One more set was taken for the same purpose of contrast, this time in a west entry and also looking slightly upgrade. The normal lighting and the conditions in this entry were somewhat better. The difference in visibility is expressed in the pictures reproduced in Fig. 6, pictures taken with five-, fifteen- and thirty-minute exposures before and after rock-dusting. It is the writer's opinion that the actual appearance to the eye both before and after rock-dusting is best expressed in the fifteen-minute exposures.

Particular attention is called to the depth of the pictures taken in the north and west entries and also in the south entry, where two random shots (Fig. 7) were taken with ordinary Verichrome films after rock-dusting and without particular care to cover lights. These two pictures were taken from the same location, the first looking south and the second north, each five-minutes' exposure.

It was a trip through this entry after rock-dusting had been done

Fig. 5—Main North near the main shaft after rock-dusting—exposures of 3, 20 and 30 minutes with the same lighting and conditions as in Fig. 4.





that brought home to the writer most forcefully what he believes to be an extremely valuable asset of rock-dusting (beyond protection against the explosion hazard) in increased visibility on haulageways, which has numerous safety advantages known to all mining men. Perfect visibility of up to more than one-half mile is perfectly demonstrated in some of these actual film records without benefit of any artificial or trick lighting.

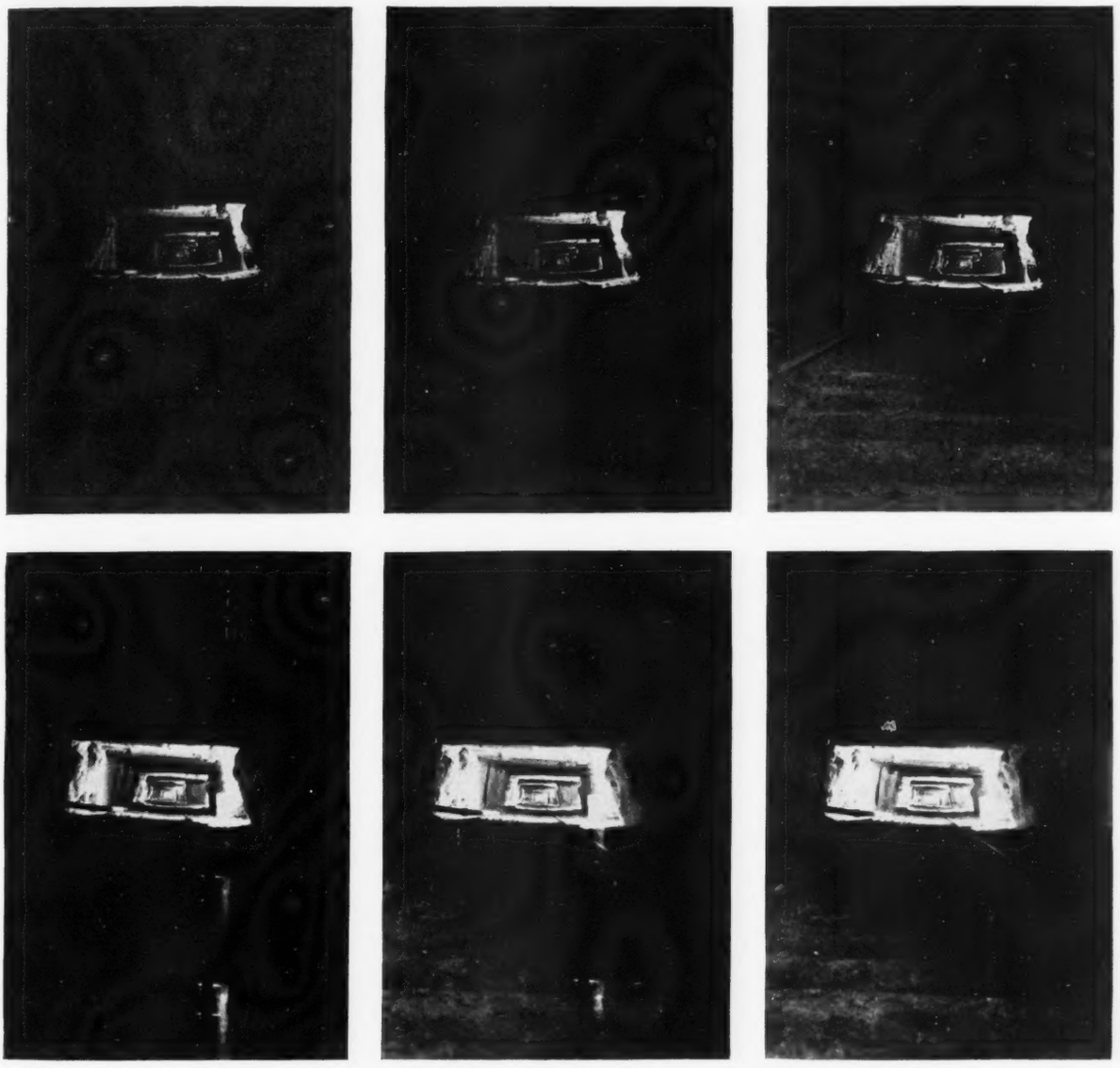


Fig. 6—Main West entry before and after rock-dusting, other conditions remaining the same.

Fig. 7—South entry after rock-dusting, looking both ways from the same location, 5-minute exposures.

NO OLD-AGE LIMITS

+ In the Anthracite Industry

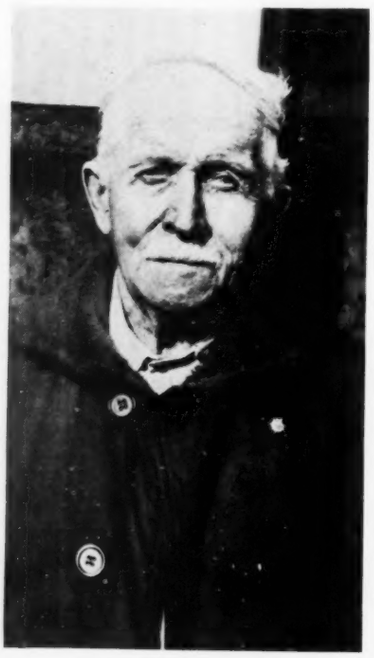
Public Relations—III

"Industry ruthlessly scraps its older workers," cry the critics of American business. But does it? Certainly this is not common practice in the coal-mining industry, where men of years of service and experience are retained until they retire—usually of their own free will. Old-age employment policies as exemplified in the records of three large anthracite companies are set forth in the present article of the series on public relations inaugurated by *Coal Age* last October.

A BUSINESS that recognizes no age of retirement nor age limit of employment except a lower limit for the immature is the anthracite industry. The job is fitted carefully to suit the man. Young and abounding in agility, the younger anthracite mine worker may work on the pitch; older and less active, he may work in the level workings and in the gangway; and when age slows his steps, on the outside, in the breaker or the lamphouse.

Age does not mean idleness but some new form of activity, and many who have experience, but no longer exuberent vigor, find opportunity and even distinction in minor bossing jobs in and outside the mine, for the industry has no dead-end jobs nor jobs that end with a sudden jolt from relative comfort to a penurious jobless old age. Again, there still is room at the top for the men with executive ability. What is asked is how he will fill the job, not from what more humble occupation he has attained his experience and judgment.

Philip Miller—63 Years' Service



The active life—rough, it is true, but invigorating—and the ever-moving air in the mine are conducive to good health and manly vigor; so men of years are not few. The companies take pride in finding places suited to their declining years, and the track, the platform where rock is picked from the coal, the lamphouse, the fanhouse, the powder house, the pumproom, the timber yard, the various bossing jobs and others furnish such opportunities.

Data regarding the years of service of the employees of the Hudson Coal Co. at Coal Brook, Jermyn and Gravity Slope collieries show that the longest in service is William Bartholomay, who, after doing all kinds of jobs, including the running of the main slope hoist, today is engaged as a laborer. He has been in the service of the company 70 years. In Table I, in which the years of service are given, are also recorded the years of service as an official, the number of injuries sustained and the days lost from accident for all three collieries.

In the operating department the Lehigh Navigation Coal Co. employs 6,400 men, and from a sampling it has been found that, by a careful estimate, about 190 men have had over 50 years of service. The number of employees over 65 years of age is 260. It has been the company's policy to recognize that as the men become subject to hazard with advancing years they should be moved to places of comparative safety. Often the miners themselves who reach the age of 60 ask for a change of work and are transferred from work on the pitches to company work of some kind in the gangway. When they get still older, they are often put to work outside the mine and given jobs in the breakers, on the platform or in a somewhat similar operation relatively free of hazard and less trying to their physical powers. Some old men have been transferred to the lamphouse. Hoisting engineers long in service may be made stationary engineers.

William Gibson

At the age of 83, after 75 years of service, still continuing work as a shop foreman for the Lehigh Navigation Coal Co.

Among the 190 having 50 years of service are William Gibson, who is now 83 years old, has been with the company 75 years, and now is a shop foreman at one of the collieries. Two or three years ago, the company thought he should be pensioned, but the outside foreman did not want to lose his services, as he felt he was doing more and better work than many of the younger men. Today there are not many men over 80, although there were several three or four years ago. Among those from foreman up, only one man has served the company for over 50 years:

Table I—Service Records at Three Hudson Coal Co. Collieries

COAL BROOK COLLIERY

Name	Occupation	Years of Service	Years as an Official	Injuries	Days Lost
W. Bartholomay	Laborer	70	0	1	0
M. F. Howard	Miner	62	0	0	0
John Emmett	Sectional foreman	62	17	0	0
Patrick F. Fee	Laborer	60	0	4	23
Patrick F. Fox	Sectional foreman	59	39	0	0
Thomas Curran	Sectional foreman	58	50	1	0
John J. Hosie	Foreman	56	0	1	8*
J. H. Nicholson	Dynamo tender	56	17	2	5
M. Lopatosky	Fireman	54	0	2	26
W. Zimmerman	Laborer	54	0	1	34
J. Campbell	Laborer	53	0	4	3
William Lavin	Laborer	52	0	4	13
James Mason	Carpenter	52	0	3	6
Adolph Arnold	Outside foreman	51	24	9	6
J. J. Horan	Sectional foreman	50	38	2	1
W. J. Jones	Laborer	50	0	3	751†

* Fell on way to work. † 716 days, last injury.

JERMYN COLLIERY

Frank Giles	Tracklayer	60	6	1	1
Elihu Nicholson	Engineer	53	0	0	0
George Pendered	Engineer	52	0	1	10
C. Chesterfield	Car tester	52	0	0	0
Edward N. Stuart	Sectional foreman	51	15	0	0
J. Swindlehurst	Outside foreman	48	23	1	120
J. Flanagan	Sectional foreman	44	15	0	0
R. Seymour	Laborer	40	15	1	16
John Caveney	Tracklayer	40	0	3	18

GRAVITY SLOPE COLLIERY

C. McDonnell	Washhouse attendant	64	0	0	0
Louis Burhenn	Compressor attendant	61	3	0	0
Henry W. Simon	Laborer	58	0	1	10
P. J. Kenny	Footman	56	0	0	0
Peter Deecke	Miner	52	0	2	10
Peter McDonald	Compressor attendant	48	0	1	5
Patrick Cummings	Mine weighmaster	50	0	0	0
R. B. Nicol	Sectional foreman	49	31	1	6
Michael McHale	Miner	49	0	1	41
George Range	Miner	48	0	1	5
James Pickert	Miner	48	0	1	9
Wm. J. Grimes	Outside foreman	47	28	1	12
William Bell	Pumpman	46	0	1	2
Henry J. McGowan	Miner	45	0	0	0
Jas. T. McAndrew	Sectional foreman	45	24	2	2
John J. McHale	Laborer	42	0	0	0
John Davison	Inside foreman	41	31	1	3
Robert Woods	Docking boss	40	20	1	5

Table II—Older Employees of the Lehigh Navigation Coal Co.

Name	Present Employment	Age	Years of Service
Philip Miller	Car carpenter	79	63
Samuel Stewart	Bottom man	76	57
William McLaughlin	Wharf timberman	76	66
Frank Barrett	Lampman helper	74	64
William Newton	Lampman	73	56
John Tucker, Sr.	Inside laborer	73	52
Albert Washburn	Lampman	72	57
John Pollock	Company miner	72	63
John F. Boyle	Inside transportation boss	72	63
James G. Kane	Outside laborer	71	63
Charles Stewart	Hoisting engineer	70	58
Frank Eckrode	Machinist	70	59
William Hoffman	Locomotive engineer	70	56
John M. Bond	Lampman	69	58
William Emmanuel	Timberman	68	59
Charles Hoffman	Station tender, inside	68	57
Robert Gormley	Hoisting engineer	68	58
Daniel O'Donnell	Contract miner	68	57
John McHugh	Contract miner	67	57

Thomas J. Jenkins, aged 73 years, with 63 years of service. In the earlier years, boys of tender age often went to work, but that practice has long since ceased. Table II gives a list of the older employees.

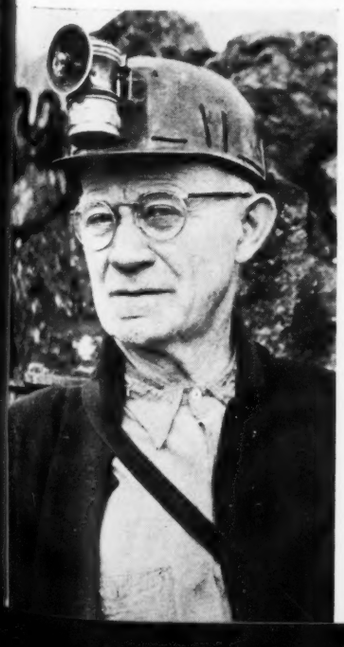
Of the men belonging to the United Mine Workers who are employed by the Philadelphia & Reading Coal & Iron Co., 289 are over 60 years of age. Many of them have never worked for any other company. The company has had to close many of its mines, and so has employed few new and younger men. It has adhered always closely to the policy of reemploying idle men from the collieries not in operation. Hence, the men it has employed in recent years have been of riper age and experience. Its record of length of service of its official staff is as in Table III.

A number of former officials have been retired on pensions after having given their entire life's service to the company. In addition to the officials mentioned in Table III are any number of mine foremen, assistant mine foremen, etc., who have given their entire life's service to the company, all starting from the bottom and working their way up to their present positions.

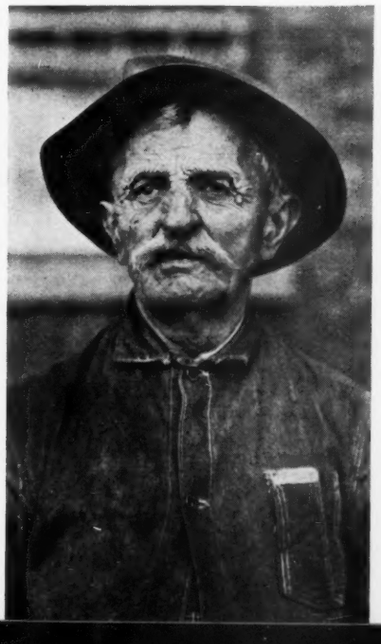
Table III—Roster of Officials of Long Service With Philadelphia & Reading Coal & Iron Co.

Official	Position	Years of Service
John G. Reid	Manager, Pottsville shops	50
Paul Harner	Head of shipping dept	49
F. C. Caldwell	Division superintendent	40
Louis Eberle	Head, land dept	38
Leo Freiler	Colliery superintendent	38
G. A. Roos	General manager	35
T. V. Monahan	Division superintendent	35
Leslie Lamont	Mechanical engineering dept.	35
Evan Williams	St. Nicholas breaker	34
Norman Harrison	Colliery superintendent	33
Edward Williams	Superintendent, Locust Summit breaker	33
J. T. Jennings	Head, electrical dept	30
Peter Dhein	Chief draftsman, Pottsville shops	25
Joseph Brennan	Colliery superintendent	24
W. S. Zartman	Colliery superintendent	23

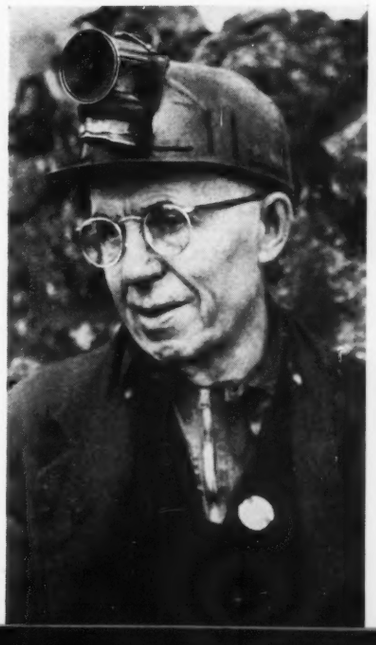
M. F. Howard—62 Years' Service



Wm. Bartholomay—70 Years' Service



Thomas Curran—58 Years' Service



Patrick F. Fox—59 Years' Service

ROOF SUPPORT

+ In Openings at Various Angles In Pitching Coal Seams

By PHILIP B. BUCKY
Associate Professor of Mining
School of Mines
Columbia University

THE previous article in this series* concerned itself with flat lying deposits and a sandstone roof (Fig. 1). However, the reader in the bituminous fields seldom encounters sandstone directly on the coal, as his roof is either coal, slate or slaty sandstone. The general procedure and formulas developed hold for any roof material provided the structural characteristics of the material are known. For example, if one assumes a coal roof 2 ft. thick with structural characteristics as in Table I, Formula (1) tells us that the safe span requiring no artificial support is equal to

$$S_P = \sqrt[2]{\frac{2T^2S}{W}} \qquad (1).$$

Substituting the coal values for the letters in (1) there is obtained

$$S_P = \sqrt[2]{\frac{2 \times 2^2 \times 20 \times 144}{2 \times 80}},$$

or 12 ft., as the safe span for coal roof, whereas only 8.8 ft. is allowable for a sandstone roof. If the roof were slate, slaty sandstone or other material, and the thickness were different, the formula (1) would still hold. The span may also be determined by barodynamic test in a centrifuge.

That most of our relatively flat deposits have local dips and rolls is a well-known fact, and in highly dipping deposits, as in our anthracite fields, the effect of dip on support is a very important one. In the average mine, working dipping deposits, entries driven in a certain direction seem to stand up well, while those driven in another direction, generally at right angles to the first, are costly to maintain. Why this is so is explainable when barodynamic principles are considered. A further study of these principles uncovers means of safely and efficiently handling these problems.

Savings in initial costs of support ranging from $90,000 to $160,000 per mile of main opening are made possible by knowing what to support and how. If to this the savings in maintenance are added and consideration is given to the number of miles of such openings per colliery or pit, there is available ample financial reason for the study and solving of these problems. Moreover, the further fact that increased safety accompanies these savings and studies should not be lost sight of.

If one considers a bed dipping at an angle ϕ (Fig. 2) then it is evident that openings in this bed may be driven in the following manners:

1. With the long dimension paralleling the dip (*A*, Fig. 2).
2. With the long dimension at right angles to the dip (*B*, Fig. 2).
3. With the long dimension at some other angle to the dip (*C*, Fig. 3).

The practical conclusions of this article which primarily deal with the conditions presented are:

1. That the dip of a deposit affects the amount of support required and that advantage may be taken of this dip to decrease initial support and maintenance costs materially.

2. Openings whose long dimensions parallel the dip require less support than those in similar level deposits and the amount of support varies directly as the cosine of the angle of dip. It is suggested that dips up to 25 deg. be calculated as for flat deposits, while greater dips require specific calculations.

3. For openings whose long dimensions are at right angles to the dip, the roof length (*L*, Fig. 4) at right angles to the opening is equal to that for flat deposits, but its span (*Sp*, Fig. 4) that may be worked is less, varies directly as the cosine of the angle of dip and is equal to the span for flat deposits multiplied by the cosine of the angle of dip. A realization of this fact will save much in maintenance costs on entries and gangways in front of breasts or rooms.

Openings of this type with a section as in *B*, Fig. 2, generally call for a hitch in the rib instead of a high rib post. If openings are driven at some other angle to dip, the roof dip at right angles to the direction of the openings should be determined and calculations based thereon.

For purposes of this presentation

Table I—Structural Characteristics of Beds in Fig. 1

	b	O	ABCDEF	G
Bed or Beds	Botton Rock	Orebody		
Material	Hard sandstone	Coal	Sandstones*	Limestones
Tensile Strength,SO	400 lb./per sq. in.	200 lb./sq. in.	200 lb. per sq. in.	600 lb./sq. in.
Compressive Strength,C	5000 lb./sq. in.	2000 lb./sq. in.	2000 lb./sq. in.	6000 lb./sq. in.
Shear Strength,Sb	3000 lb./sq. in.	1000 lb./sq. in.d	2000 lb./sq. in.	2000 ob./sq. in.
Modulus of elasticity,E	5×10^6	5×10^6	10^6	5×10^6
Modulus of Rupture,R	800 lb. per sq. in.	300 lb./sq. in.	500 lb./sq. in.	1500 lb./sq. in.
Weight per cubic foot	150 lb.	80 lb.	150 lb.	150

* Data for slaty sandstones are as follows; tensile strength, 100 lb. per square inch; compressive strength, 2,200 lb. per square inch; shear strength, 600 lb. per square inch; modulus of elasticity, 5×10^6; modulus of rupture, 450 lb. per square inch; weight per cubic foot, 120 lb.

* *Coal Age*, October, 1938, p. 35.

let it therefore be assumed that the geologic structure is the same as that in Fig. 1, with the added provisos that the beds dip at an angle ϕ with the horizontal, the surface conforms with them and the structural characteristics of the material are the same as in Table I. Table II gives a list of symbols used in this discussion.

Openings With the Long Dimension Paralleling the Dip.—Slopes, inclines and main entries are generally driven in this direction and a section through them at right angles to their length will show as in Fig. 3, while a section parallel to the dip will show as in Fig. 2*A*. If posts, stulls or sets are assumed as being placed at right angles to the dip, the direct load per set or post will be WL^T cos. ϕ, Fig. 2. Assuming a load* as previously calculated for the 16-ft. level opening (20,000 lb.) and an angle of dip of 45 deg., gives the load per set or prop equal to cos. 45 deg. x 20,000, or 14,140 lb. Assuming a batter up the slope of $\frac{1}{4}$ in. per foot, or 2 per cent, the timber may be assumed as large enough to carry a load of 1.02x14140, or 14423 lb., which means that the saving on timber required, as compared with a level opening, is $\frac{20000-14423}{20000} \times 100$, or 28 per cent. If the angle of inclination of the bed is 90 deg., then cos. ϕ is 0, and no support is required.

The proportion of the load paralleling the dip has its effects and if no bond is present between layers, it is balanced by its own shear and compressive strengths, which in comparatively small openings need give little concern. For example, Bed *A* at a 45-deg. dip has a component paralleling the dip per 5-ft. length of entry equal to 5 $W^TSp^\dagger$sin. 45 deg., or 5 x 300 x 16 x .707, or 17210 lb., which is supported by 20 sq.ft. of shear area capable of standing 20 x 144 x 2000, or 576,000 lb., and 32 sq.ft. of compressive area that would stand 32x2000 lb., or 64,000 lb.

It therefore is evident that openings whose long dimension are directly up or down the dip require less support than those driven in level deposits and the amount of support necessary for the same spacing and span varies directly as the cosine of the angle of dip. For this type of opening one may therefore calculate the artificial support required for flat workings and multiply by the cosine of the angle of dip. If one consults the cosine curve and decides that no particular change will be made unless a 10 per cent saving in timber or materials will be made, one finds that with dips up to 25 deg. no changes in timbering will be necessary, but when the dips increase beyond this, savings increase at an accelerating pace. It is obvious from the above, therefore, that the most important functions artificial support would serve for the conditions with high dips are to support track and guides rather than roof. The timber required if placed at 5-ft. intervals along the center line would have a cross-sectional area of 14.5 sq.in. and be 4.3 in. in diameter. The cost per prop at 10c. per board foot would be

$$\frac{14.5 \times 60 \times 0.10}{144}, \text{ or } 60\text{c.},$$

and the cost of timbering per foot of opening would be 12c. These timbers should, of course, have soft wooden wedges to allow for roof sag or deflection.

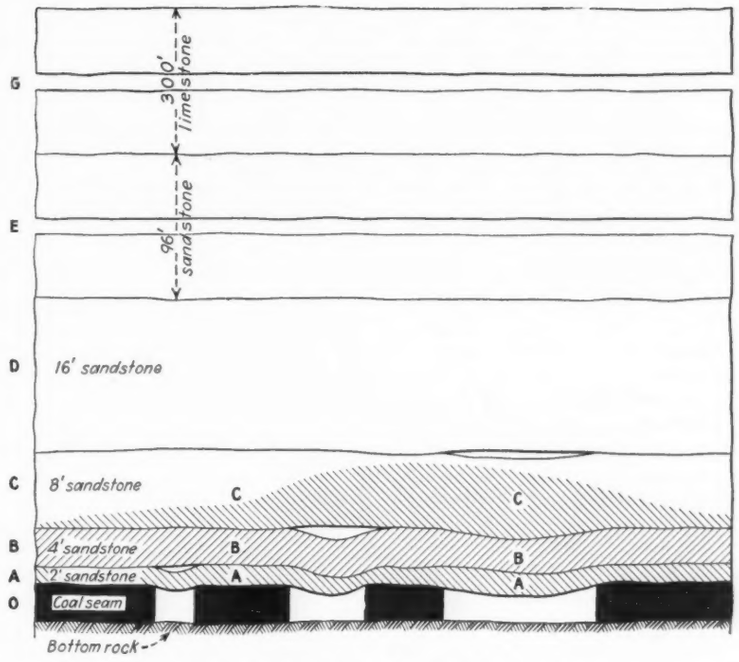


Fig. 1—Typical stratification of material over coal seam

Table II—Explanation of Symbols Used in Accompanying Text

Sp	=	Horizontal span across opening.
L	=	Length of roof for span Sp.
W	=	Roof load per foot length and width.
d	=	Defilection in feet.
S	=	Allowable tensile stress,pounds per square foot.
C	=	Allowable compressive stress, pounds per square foot.
Sb	=	Allowable shear stress, pounds per square foot.
T	=	Thickness of roof beam in feet.
d	=	Distance between supports.
I	=	Moment of inertia.
D	=	Angle of dip of bed.
a	=	Angle of opening with strike.
Bd	=	Angle of dip of roof in an opening.
b	=	Assumed breadth of beam.
E	=	Modulus of elasticity.

Openings Driven With Long Dimensions at Right Angles to the Dip—This condition is generally met with in cross entries, gangways and drifts in front of stopes in dipping deposits, for, as a general rule, working places are driven up the dip to facilitate drainage and haulage or ore or coal movement in the stope, breast or room. Mines which have high dips or many rolls with variable dips experience support difficulties where these openings are driven at some angle to the dip.

Fig. 4 shows a section through an opening driven at right angles to the dip. The general geologic section is assumed as in Fig 1, but in addition all beds are assumed to dip at an angle ϕ. It may be noted that *Sp* is the horizontal span and *L* the length of roof.

Since gravity acts downward, the weight of any bed or group of beds may be assumed as *W* and the normal component (*N*) is then *W* cos. ϕ, while the component parallel to the bed (*P*) is *W* sin. ϕ. The parallel component *P* results in tension at the upper end of the roof beam and compression at the lower end. The vertical reaction at both supports may be assumed equal to $\frac{WL}{2}$. *Sp*

The maximum unit tensile stress in Bed *A* therefore is equal to the sum of the stresses due to the tension of the Force *P* parallel to the bed

* *Coal Age*, October, 1938, p. 33.

† For explanation of symbols, see Table II.

and the bending due to the Force N perpendicular to the bed, which may be stated alegebraically as follows:

$$S = \frac{W \cos \Phi L^2 \times \frac{T}{2}}{12 \times I} + \frac{W \sin \Phi L}{T}$$

For one foot of width of opening parallel to the entry under Bed A, Figs. 1 and 4, and a slope of 45 deg. this becomes 2,880 =

$$\frac{300 \times 0.707 \times L^2 \times 1}{12 \times \frac{8}{12}} + \frac{300 \times 0.707 \times L}{2},$$

from which $L = 8.8$ ft., as previously calculated.

The interesting point is that the length of roof L in dipping deposits where the openings are driven at right angles to the dip, and which will result in the same unit stresses, is equal to the span that may be worked in a flat deposit. The span (Sp, Fig. 4) that may be worked in a dipping deposit where the opening is driven at right angles to the dip is less than that for a flat deposit and is equal to the product of the Span Sp for a flat deposit and the cosine of the angle of dip, or Sp cos. ϕ.

If one now assumes a 45-deg. angle of dip, one finds that the unsupported span (Sp) that Bed A will support equals 8.8 ft. × 0.707 (cos. 45), or 6.2 ft. The Span Sp that Bed B will support equals 12.4 ft. × 0.707, or 8.8 ft. The Span Sp that Bed C will support equals 17.5 ft. × 0.707, or 12.4 ft. The Span Sp that Bed D will support equals 24.5 ft. × 0.707, or 17.3 ft.

A study of the preceding figures brings home the fact that if a 16-ft. opening with 7-ft. Span Sp is to be driven at right angles to a 45-deg. dip, then the underweight to be supported is now composed of Beds A, B and C (16 ft.) instead of Beds A and B (6 ft.)* when the openings were in flat deposits. It also is evident that if Underweight A is not to be taken down, a line of posts down the center will not serve the purpose, as the maximum open span (Sp) allowed is 6.2 ft. and 8 is required. To support this opening one must therefore go to the use of a bar with two rib and one center posts, or a bar with one hitch, one rib and one center post.

Calculations for 45-Deg. Dip and 16-Ft. Opening—The underweight supported will have a length (L) equal to 16 ÷ cos. ϕ or 16 ÷ 0.707 = 22.6 ft. The underweight to be supported for this span is equal to Beds A, B and C (2, 4 and 8 ft.) or 14 ft. instead of 6 ft., as previously.

The load taken by the upper bed, C, when it assumes its deflection may be approximated from the formulas

$$W = \frac{2ST^2}{L^2} = \frac{2 \times 2880 \times 64}{22.6^2}, \text{ or 722 per foot.}$$

The deflection allowable in Beds A and B therefore =

$$d = \frac{WL^4}{384EI} = \frac{8 \times 150 \times 22.6^4 \times 12}{384 \times 10^6 \times 512} = 0.0193 \text{ ft.}$$

The bed load supported by Bed B itself equals

$$W = \frac{384\,EId}{L^4} = \frac{384 \times 10^6 \times {}^8/_{12} \times 0.0193}{22.6^4}$$

= 145 lb. per foot.

The bed load supported by Bed A itself equals

$$W = \frac{384 \times 10^6 \times {}^8/_{12} \times 0.0193}{22.6^4} =$$

15.7 lb. per foot.

The total load, W, per foot of L = 14 × 150 — (722 + 145 + 15.7) = 1217 lb.

The load on the rib posts for an assumed continuous beam with two spans and 5 ft. between sets equals ½ × 11.3 × 5 × 1217 lb. = 34,380.

The load on the center post = 11.3 × 5 × 1217 = 67,600 lb.

If a minimum height of 5 ft. is assumed, then the short rib post is 5 ft., the high rig post is 21 ft., while the center post is 13 ft. It becomes evident that a built-up section will be necessary for the high rib post (21 ft.) and a hitch in the high rib side therefore is recommended. A 3½-in. pipe column weighing 9.11 lb. per foot (see any structural-steel handbook) or a built-up section is recommended for the short rib post. The center post conditions will be satisfied by a built-up section or an 8-in. standard pipe column weighing 21.7 lb. per foot. The load across the top, assuming an 8-ft. Span Sp to be taken care of and one hitch, is 12×5×1217, or 73,020 lb., which may be taken care of by a 12x10-in. beam weighing 58 lb. per foot.

There is here available a good illustration of the condition where hitches in the ribs are desirable: i.e., in places where the height of posts is so great that in order to meet the $\frac{L}{R}$ ratios a large amount of support is necessary.

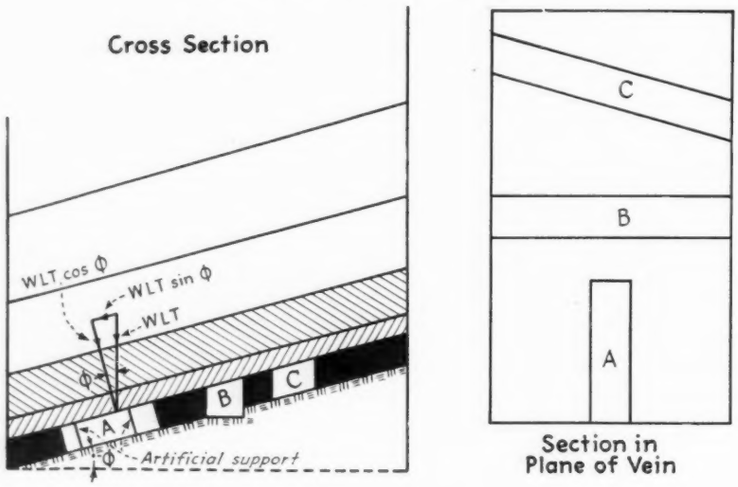
The weight per set for 5-ft. spacing will be as follows:

1 bar, 23½ ft., at 58 lb. per ft.	1,362
1 rib post, 4 ft., at 9.11 lb. per ft.	37
1 center post, 12 ft., at 21.7 lb. per ft.	260
Connections	171
Total, lb.	1,800

The initial cost per set at 10c. per pound is therefore $180. The initial cost per foot opening is 180 ÷ 5, or $36.

Good engineering practice for these conditions would limit the width of opening driven at right angles to the dip to a Span Sp of 6 ft. with support to consist of a series of posts on 5-ft. centers down the center line of the opening. The height of center post in this case will be 5 + 6, or 11 ft. The Span Sp will be 12 ft. and the length L = 12 × 0.707 (cos. 45), or 17 ft. ±. Since Bed C will support itself over a 17.5-ft. span with a safety factor of 10, the underweight

Fig. 2—Types of openings in dipping beds



A – Long dimension parallel to dip
B – " " at right angles to dip
C – " " at other angles to dip

will now consist of Beds *A* and *B*, 6 ft., as in the level deposit.

The load Bed *B* can support over a 17-ft. length may be obtained from

$$W = \frac{2\ S\ T^a}{L^2}$$ which makes

$$W = \frac{2 \times 2880 \times 16}{17^2} = 320 \text{ lb. per foot.}$$

The deflection in Bed *B* and allowable in *A* may be obtained from

$$d = \frac{W L^4}{384EI} = \frac{4 \times 150 \times 17^4 \times 12}{384 \times 10^6 \times 64}$$

$$= 0.0245 \text{ tf.}$$

The load supported by Bed *A* per foot may be obtained from

$$W = \frac{384EId}{L^4} = \frac{384 \times 10^6 \times {}^8/_{12} \times 0.0245}{17^4}$$

$$= 75 \text{ lb.}$$

The load per foot to be supported artificially therefore equals [(6 × 150) — (320 + 75)] or 505 lb.

The load to be taken by each prop at 5-ft .centers = 5 × 8.5 × 505, or 21,462 lb., which may be taken care of by a wooden prop 21.5 sq.in. in area, or 5.25 in. in diameter.

The radius of gyration of a 5.25-in. diameter prop is 1.31 in. and if the length of prop is 13 ft., or 156 in., its $\frac{L}{R}$ ratio = 150 ÷ 1.31, or over 100.

The minimum-sized prop to be used, therefore, is such that four times the length divided by the diameter = 60, from which the diameter equals four times the length divided by 60, or 10.4 in. With wood at 10c. a board foot in place it would cost

$$\frac{1}{4} \times \frac{\pi \times \text{diam.}^2 \times \text{length} \times 10}{144} = \frac{1}{4} \times \frac{3.1416 \times 10.4^2 \times 156 \times 10}{144},$$

or $9.40 per prop or 1.88c. per foot of entry.

This load may also be taken care of by a built-up section or a standard 8-in. pipe column weighing 21.7 lb. per foot that will weigh 13 × 21.7, or 282 lb., and cost $28.30 per prop, or $5.66 per foot of opening. All props should be checked for shear area as outlined in the previous article.

Openings With Long Dimensions at Other Angles to the Dip—If the opening be driven so that its long dimension makes some angle other than 0 or 90 deg. with dip, the problem may be handled by determining the dip of the roof bed in a direction at right angles to the long dimension of the opening. Once this dip is determined, it may be handled as previously.

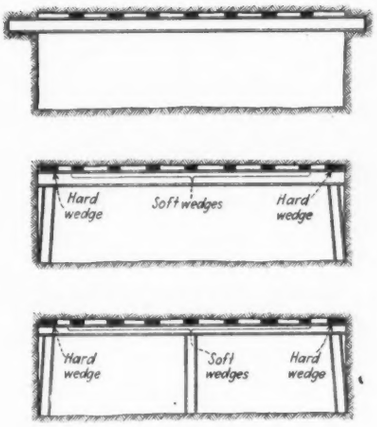


Fig. 3—Typical timbering systems

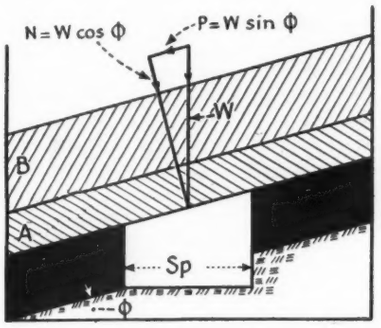


Fig. 4—Section through opening at right angles to dip

When an opening is driven at an angle to the strike in a dipping deposit, the dip of the beds at right angles to the direction of driving of an opening may be obtained from the following relationship: Tan *Bd* = cos. *a* tan *D*, where *Bd* is the angle the bed dips at a section at right angles to the long dimension of the opening; *a* is the angle between the strike of bed and the direction of the opening and *D* is angle of dip of the bed.

For example, if an opening were driven to make a 30-deg. angle with the strike in a deposit dipping 45 deg., then tan *Bd* would equal cos. 30 deg. tan 45 deg., or 0.866, or *Bd* equals 40 deg. 54 min. For a 16-ft. Span *Sp*, *L* would equal 16 ÷ cos. 40 deg. 54 min., or 16 ÷ 0.76, or 21 ft. *L* therefore decreases as the angle the opening makes with strike increases, and it may also be shown that the post lengths for center and long posts also decrease.

May it be emphasized that support for the type of structure and opening here considered should be sufficient to support the load and placed as soon as space is available. It is also desired to emphasize that provision is here made for allowing the rock itself to assume part of the load. If too much opening is made before support is placed, the lower beds fail and the supporting power of the bed allowed for is lost. Such a procedure leads to difficulty with roof support and maintenance, for then the bed is stressed beyond the elastic limits and its power to support itself may be in a great measure lost.

In the placing of posts and crossbars, it is essential that: (1) The posts have good bearing surface and be set so that the bottoms cannot move; (2) that the connections between posts and bar be on line and rigid; (3) that wedges over rib posts be hard, preferably metal, so as to allow no give; (4) that wedges over the bar at other points be of yielding wood. Posts set along an opening center line should have a good bottom, with wedges at the top to allow give only in the wedges. In openings running up the dip they may have a slight inclination.

Comparisons—The lowest initial costs for supporting a 16-ft. opening providing 7-ft. clear spans are as follows: 17c. per foot length opening in flat deposits in any direction; 12c. per foot length of opening in deposits dipping 45 deg. and with the long dimension of the opening paralleling the dip, and $36 per foot length of opening in deposits dipping 45 deg. and with the long dimension of the opening at right angles to the direction of dip.

These three figures—17c., 12c. and $36—present forcibly the relative importance of the support problem and the effect of dip in relation to support, safety and general mining costs.

It is therefore evident that the cheapest opening to support is one going up or down the dip, and the most expensive is one at right angles to the dip. The elements that tend to increase support costs in openings at right angles to the dip are the excessive length of roof, *L*, necessary to get Span *Sp* and the fact that post sizes are governed more by the slenderness ratio (l/r) than the area of wood or steel they contain.

Good engineering practice and foresight, however, can, by reducing the open span to 6 ft., reduce the initial cost per foot for openings at right angles to the dip from $36 to $5.66. On this type of opening the difference in initial costs is $36.00 — $5.66, or $30,34 per foot or, 5,280×30.34, $160,100 per mile.

LOCOMOTIVE OPERATION

+ Aided by Anti-Friction Bearings

By W. J. WALKER
Transportation Department
Erie (Pa.) Works
General Electric Co.

WHEN overhauling or repairing mine-locomotive trucks it is sometimes possible to equip them at slight additional expense with roller bearings, which are now standard equipment on many modern electric locomotives and which can be readily adapted to much of the older equipment now in service. Roller bearings are particularly desirable on locomotives of outside-wheel construction because bearings on these locomotives are not accessible, and hence are generally more costly to maintain.

Taper-type bearings are generally used because this type of bearing takes the side thrust and thus eliminates the troublesome thrust plates required with ordinary brass journal bearings. Brass bearings wear rapidly, require a great deal of attention to keep properly lubricated, and are difficult to seal against the entrance of dirt and other abrasives. With roller bearings there is less friction, longer bearing life, less frequent inspection and lubrication, less lubricant used, a reduction in maintenance cost, and greater locomotive availability.

Keeping dirt out and lubricant in is a matter of the utmost importance in using roller bearings and the journal box must be so constructed as to make certain that this is done. In the later types of locomotives, the journal box is equipped with annular-groove closures and a labyrinth seal to prevent the escape of lubricant and the entrance of abrasive substances. On these locomotives the forced system of lubrication supplies an ample quantity of lubricant to the bearings and aids the labyrinth seal in keeping out foreign substances.

On some outside-wheel locomotives, space limitations do not permit using a grease spreader or spacer between the cones of the bearing. For such installations the bearings must be equipped with special grooves cut in the back of the cones. Where this construction is used, replacements must be made with this same type of bearing because when the cones are mounted back to back and lubrication is through the axle, grease can be introduced into the bearings only through these grooves. On the outside-wheel type of locomotives the grease fitting usually is recessed into the axle where it is protected and yet easily accessible. On the inside-wheel type of locomotive the grease fitting can be located on, but should not extend beyond, the end plate of the journal box.

Since the tapered roller bearing is adjustable, it is not necessary that the length of bearing fits be held to close limits. A length tolerance of 0.020 to 0.030 in. is permissible be-

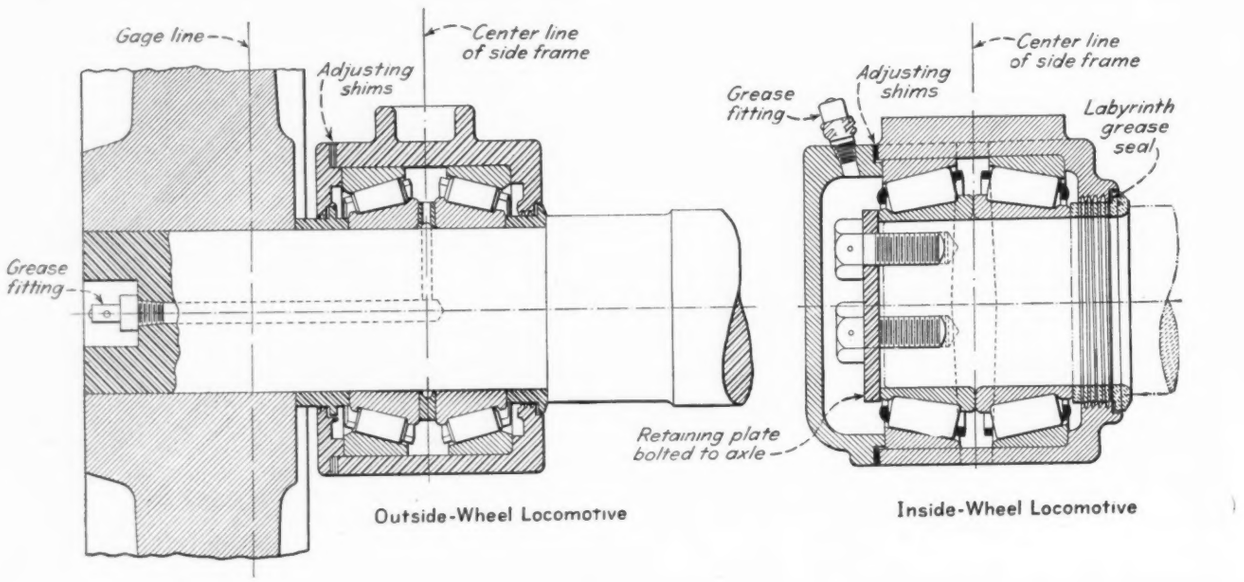


Fig. 1. — Sectional views of roller-bearing journal boxes showing method of lubrication and labyrinth grease seals.

cause the bearing adjustment can be varied within this range. Diameters, however, must be accurate and the axle must be ground for the cone seats. The fit should be equal to the bore of the bearing cone plus 0.0005 in. for each inch of cone bore plus 0.001 in. for maximum diameter. Minimum axle diameter should be made equal to the bore of the bearing cone plus 0.001 in.

To seat the bearing on the axle properly, the bearing is heated to not more than 3000 deg. in an electric oven or in boiling oil, slipped over the axle and against the shoulder or collar which forms the labyrinth grease seal. Suitable collars and spacers must be provided and the whole bearing assembly clamped tightly in place. On an outside-wheel locomotive the assembly is locked in position simply by pressing the wheel on. Tap bolts usually are inserted in the end of the axle to clamp a retainer against the bearing assembly on inside-wheel trucks.

Shims should be provided for adjustment of end play and these usually are 0.005 in. thick. When the box is first assembled, sufficient shims are used between journal box and cover to permit the bearing to turn freely without appreciable end play. When the bearing wears, shims are removed so that end play will be held between 0.001 and 0.005 in. In this range, box and bearings turn free on the axle, but without excessive looseness. It is advisable to remove the wheel-and-axle assembly from the locomotives when this adjustment is to be made because it is difficult to check tightness of the bearing when under load.

CONVEYORS AT LATUDA, UTAH

+ Permit Reduction of Open Area Protecting Mine Against Squeeze

By R. DAWSON HALL
Engineering Editor, Coal Age

HAND LOADING by shaking conveyors has been introduced in the new mining work of the Liberty Fuel Co., at Latuda, Utah, as best suited to Subseam No. 1, which it is mining. It is believed that, in view of the severe pressures of the 800 ft. of cover, it is best to work only two rooms at one time in any one heading and to proceed at top speed with the aid of conveyors, so that the coal mined will have to support only the normal weight of the rock above and will not pinch the cutter bar.

With steady working, these two rooms are thus driven their full length of 300 ft. and have their pillars drawn back to their necks in only fifteen working days or three weeks of steady operation. The coal will act at all times almost as would the same coal in an entirely virgin area. Should working time be irregular, it will be still more advantageous to have a small area opened, but at these mines rooms are not driven during the slack times. Of course, economies from the use of machinery also enter importantly into the consideration, but permanence of the mine, safety of employees, and a smaller area to be serviced are items by no means to be ignored.

Latuda lies in Carbon County, Utah, in Spring Canyon, a branch of the Price River Canyon, running nearly east to Helper on the latter. In the main, but with many abrupt turns, Price River travels almost due southeast through the Book Cliffs coal field. The Book Cliffs are so named because the bold escarpments look like the edges of books, with the friable material representing the leaves, and the hard material, the bindings. But, viewed by its skyline, its mesas, or tableland areas, of hard rock, broken here and there by gulches or canyons, are designated "castles," and the district frequently is known as the Castle Valley area. Principal among these rocky prominences is the well-known Castle Gate, on the upper end of the Price River Canyon.

Working Lowest Seam

Early operations in Spring Canyon singled for operation the thickest of the seams, but these did not always contain the cleanest and least friable of the coals, so that some sections made a false start. The demand for large and low-ash coal has made it necessary to look to other beds than those originally operated. Thus, the Liberty Fuel Co. mined Subseam No. 3, which has an average thickness of 9 ft., but the work to be described is in Subseam No. 1, which formationally is the lowest seam of any in the field, except for certain unmined beds that appear to exist below the thick Mancos Shale by which this field is underlaid. Subseam No. 1 is from 5 to 7 ft. in thickness.

Its coal has practically no extraneous ash and it has negligible cleats, so that the coal breaks with a rocklike fracture and has a hardness not unlike rock. In fact, in cutting across a 25-ft. face, a set of reversible bits will have to be turned once and discarded after the cut is completed, and this not because of igneous dike matter, spars or pyrite balls, which alike are absent, but because of the inherent hardness of even the clean coal.

In many ways the two seams differ. The upper seam is moderately

wet, possibly because of the lighter cover and heavy porous sandstone which overlies the coal. It has several faults running north 45 deg. west, a number of petrified trees in the coal near the roof, and some sulphur balls. By contrast, the lower seam has little water, no signs of petrified trees anywhere in the coal and no sulphur balls, but it does contain a few dinosaur foot tracks in the coal near the roof, which should be noted promptly, if possible, and removed or secured, for they constitute a hazard to miners. Igneous rock spars are absent in both seams.

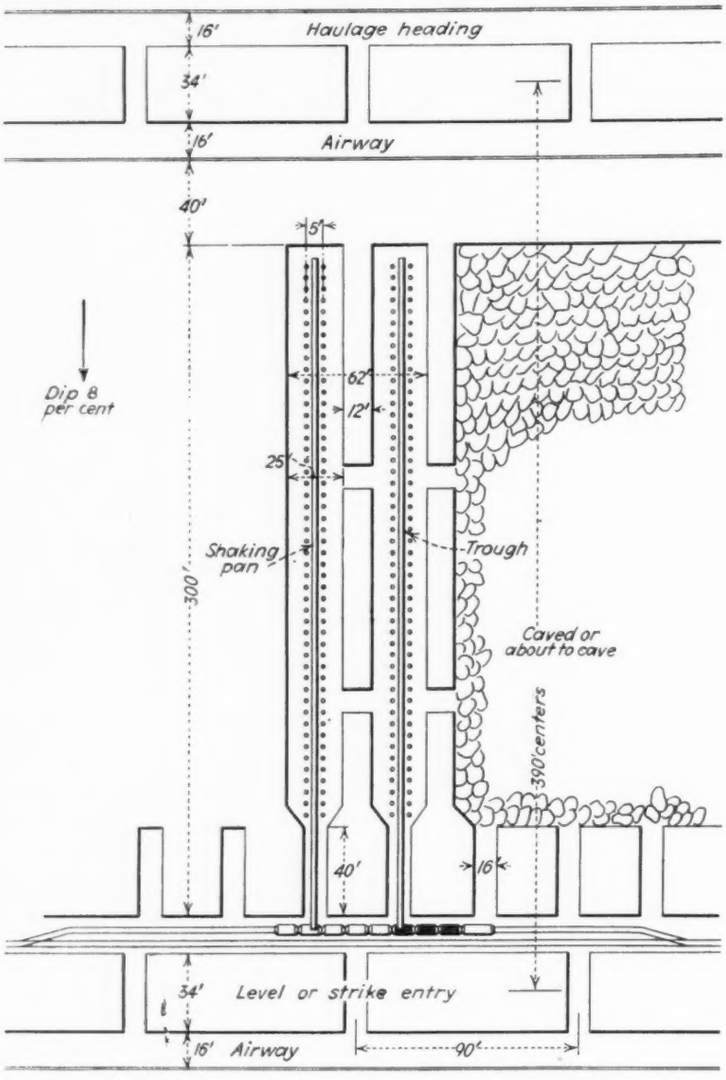
Coal in the lower seam is undercut to a depth of 6½ ft. by Sullivan shortwall machines using Bowdil cutters and making a 5-in. kerf. A few inches of coal is left in the bottom to avoid cutting into the floor, for the coal separates with difficulty from the bottom rock. Room width is 25 ft. Two rows of local Douglas fir timbers, 5 ft. apart both between rows and in the direction of the row, are set by timbermen.

Like the floor, the roof is a hard sandy shale and shows no disposition to break in a room span, and rooms might be driven safely without timbers, but posts are set in every case; in part for an added assurance of safety and in part because they are useful for slinging the pans of the conveyor. Some ball frames have been used, but the management prefers to swing the pans, and it is probable it will standardize in favor of pan suspension because the floor is on an uneven gradient, which straight up the pitch averages 8 per cent.

However, owing to the direction of property lines, the rooms at present are driven half way between strike and pitch, and rise only 4 to 5 per cent. It is likely that future rooms, unhampered by these exigencies, will be driven straight up the pitch, as in Fig. 1. To do this will involve, the management recognizes, more stress on the pans and couplings, but it will evade the necessity of providing a long easy gradient at the discharge end where the pans have to be elevated 4 ft. above the car bottom.

Rooms are driven 300 ft. long. The face is drilled with Chicago Pneumatic electric drills, sixteen shots being placed in a 25-ft. face. Of these, two double vertical rows of three shots each are drilled at either end of the face, the more central line of holes being directed a little toward the center. What might be termed a pair of "buster" shots low in the seam are drilled near the center of the face and a pair of top shots near the roof, also not far from the center. (However, as all the sixteen shots are "fired" instantaneously, there can be no true buster shots.) The left holes of each pair of shots are inclined to the left rib and the right holes to the right rib.

Rooms are driven so as to provide two thin pillars, each of which is removed in two slabs, both 6 ft. wide and about 90 ft. long. The shaking pans are slung between posts.



Well Carbon Dioxide Used

Cardox shells are used for "shooting," using carbon dioxide from the Wellington gas wells about seven miles south of Price. These produce a gas 98.8 per cent pure under 900-lb. pressure, and this is used unscrubbed for shooting after being compressed to the required degree. In earlier years, delay shooting with explosives was customary in this field, but it has been abandoned because of its hazard. Now that Cardox is used, it is permissible to shoot during working hours, thus greatly speeding operations, which in turn is conducive to safety.

Conveyors are placed in the centers of rooms and are of Vulcan Iron Works (Denver) manufacture. Each is equipped with swiveled pans, the end trough of which is flattened into a plate. The trough, with these swivels, can be directed 40 deg. on either side of the center line and, in fact, with washers, that deviation can be further extended. No duckbill is used, but some of the coal falls on the flattened plates and does not have to be shoveled.

Each room has its own conveyor. Rooms are driven in pairs connected

by crosscuts at 90-ft. intervals. The distance between the left rib of the left room and the right rib of the right room is 62 ft., hence, as each room is 25 ft. wide, the pillar between rooms is 12 ft. thick. A pillar of equal size is left between the pair of rooms and the former pair which has been abandoned. Hence, each of the pair of rooms has on one side a 12-ft. pillar to be removed in sections by two slabbing cuts 90 ft. long. Thus both machines end their depillaring together, but they remove their pillars only to a point 40 ft. from the heading.

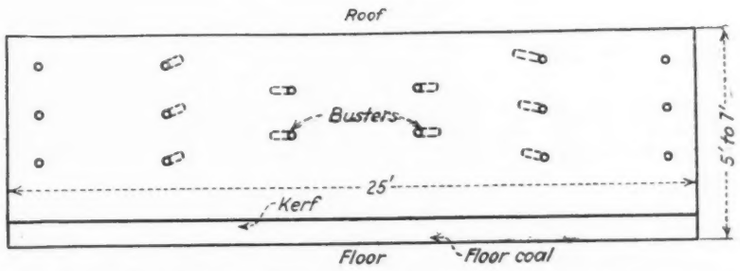
Meantime, another unit has necked two more rooms, but driven them only 40 ft., and these places are ready for extension. As a place 500 ft. wide and 260 ft. long has stood for weeks without caving, it readily will be seen that it is possible to retrieve the posts, 80 per cent of which are recovered. Sylvester post pillars are used on occasion. In fact, the roof usually will not break until four rooms have been finished and their pillars drawn, making an open area 136x260 ft. without support. Should any pillar have been left, it is shot to diminish its resistance.

In the slack period of the year only the headings in strike, or level, entries are extended, but in the winter these entries are not driven and work is confined to a pair of rooms and their pillars because these furnish a larger tonnage. Because worked only in active operating periods, the rooms have never had to stand open any longer than suffices to cave them.

Steady Stream of Cars

To accommodate the loading of coal, "pot holes" are shot in the roof of the heading over the end of each conveyor, and a temporary sidetrack is provided so that an empty trip of eight cars can be run past the loading points of the two rooms. Meantime, another trip of cars is being backed into the track behind the cars being loaded, replacing them as soon as they are drawn out by the locomotive to which they are attached. The locomotive stays with the cars as they are loaded and moves them forward on signal from the "nipper," who serves also as a room-mouth loader, so there is no delay.

Two Mancha and one Baldwin Westinghouse locomotives are in service. All three are storage-battery units with 52-cell Exide Ironclad batteries. They haul the coal to the rope on an underground plane a distance of 1,600 to 2,000 ft. Cars are lowered in eight-car trips down the plane, a distance of three-quarters of a mile, by a Vulcan Iron Works (Denver) hoist with 300-hp. continuous-rating motor and 20,000-lb. rope tension. Regenerative braking is provided. The hoist is located inside the mine. Cars hold 3 tons when mechanically loaded. A larger number of 4-ton hand-loaded cars are lowered also. All are solid composite cars with Timken or plain roller bearings. The oak bottoms have their plank spaces covered with strips to prevent leakage.



Coal is brought down by expansion of carbon dioxide. All "shots" are fired together, but two lower shots at center act as "busters" to break down the coal over the center of the cut.

One Conveyor Necks Rooms

In all, there are five conveyor units, the fifth being necessary to drive the 40-ft. necks. Each room unit produces about 120 tons per seven-hour day. All machines are driven by 440-volt alternating current.

At each pair of faces are a machineman, driller, five loaders and a timberman. To this list may be added half the time of two motormen and two nippers, for they serve two pairs of drives, dividing their time between them. The third locomotive aids in the driving of necks, the loading and removal of pot-hole material and the placement of drives. Sometimes five cuts are made in seven hours in the face of each heading of an entry. Entries have been advanced as much as 800 ft. in a month, but this is not only a maximum but has been attained by utilizing the service of the night shift for what time remains to it after it has completed its work of necking, pot-holing, and drive-setting. Timbermen make their cap pieces, keep the conveyor pan line tight, and place timbers and remove them.

All haulageways, planes and airways are made 16 ft. wide. As there is no gob, this width is available in its entirety for air, except space occupied by tracks, mine cars and locomotives. Side pillars in the planes are 50 ft. wide; those on the strike entries are 40 ft. wide. Centers between strike headings are 50 ft. Strike entries are at 390-ft. centers.

All the workings to the north of Spring Canyon develop gas. Those to the south do not, because there are outcrops in all directions. Because the body of coal to the north is large, does not outcrop in that direction, and is heavily covered, reaching a depth that can only be imagined, its gas can escape only through Spring Canyon or into the mines. A Jeffrey 6-ft. Aerovane fan having ten half blades, the first installed in Utah, produces 80,000 cu.ft. of air against a 1½-in. water gage. A measurement of the gas in the return showed 0.02 per cent of methane. The simple two-room method of extraction provides for a most efficient use of the air, and the 12-ft. pillars make frequent crosscutting feasible when driving rooms.

Water and Rock Dust Used

Because Cardox is used and the coal is not friable and because the rooms are so rapidly completed that no large area of working is available for the lodgment of dust, only headings are rock-dusted. For this purpose gypsum dust is used. A water line is taken to the face of each room and entry. Tops of trips are wetted with a spray as the rope pulls them off the parting at the plane.

Hard hats and hard-toed shoes are used everywhere underground. Goggles protect the eyes while men are picking and hammering, but are not compulsory elsewhere. Men that need them wear refractory lenses. All men are examined by the company doctor before hiring or rehiring.

Though the normal tonnage of the conveyor-mine operation is 500 daily, with the product of the other mine the daily output is 1,200 tons. L. R. Weber is president and G. A. Schultz is superintendent.

JEDDO-HIGHLAND OPERATES

+ Big Steam-and-Electric Plant

At Highland No. 5 Colliery

A LARGE hoist, demanding a large quantity of steam, a heating load and an adequate supply of water favored the construction of a company power plant at Highland No. 5 breaker of the Jeddo-Highland Coal Co. To take advantage of an opportunity to reduce the cost for steam and electricity, the company in 1934 erected a power plant, which greatly lowers the fuel costs for carrying the original steam load and also generates a large block of electrical energy for use at this and other mines of the company.

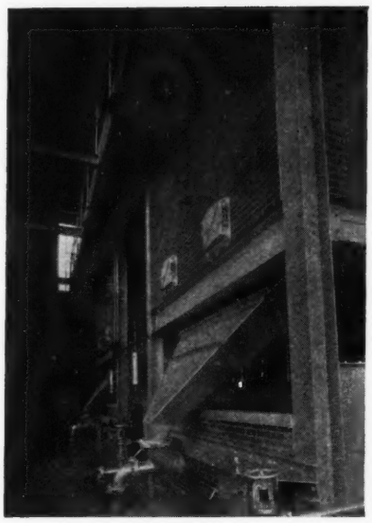
Two 700-hp. boilers equipped with Coxe chain-grate stokers burning No. 5 buckwheat, or silt, operate at 450 lb. pressure and 125 deg. superheat. Electricity is generated in a General Electric extraction-type condensing turbine which is bled to supply steam at 165 lb. for a 25x28-in. twin hoisting engine, a breaker engine, triple-expansion pump and direct-current generator. When operating the old hand-fired boiler plant, which the new plant displaces, fourteen firemen were employed and No. 3 buckwheat, or rice, was used as fuel.

A second condensing turbine unit rated at 1,000 kw. and built for 160 lb. pressure, the only item of used equipment installed in the plant, provides energy in emergencies. It can be operated through a reducing valve and desuperheater from the new high-pressure boilers or, if necessary, the old low-pressure boilers can be fired to supply it with steam. The electrical supply is safeguarded by a connection with the power company lines, which still supply a large quantity of power.

Low-pressure (160-lb.) steam in excess of that extracted from the turbine is supplied through two reducing valves; one adjusted to come into operation only when the capacity of the other is taxed so that the presure drops a few pounds below 160. The desuperheaters, which are installed in the steam lines on the low-pressure side of each valve and which were furnished by the Elliott Co., consist of small steam chambers containing Monel shavings onto which water is sprayed under automatic control. Thus additional low-pressure steam is generated by the heat extracted from the highly superheated steam derived from the reducing valve.

Boilers are the four-drum bent-tube type made by the Combustion Engineering Co. The design incorporates a new arrangement whereby the front arch is supported by a water wall. Forced and natural drafts are automatically regulated to the

As the plant appears from the approach by highway.



Jets move the fly-ash from hoppers at rear ends of boilers into ash hoppers leading to conveyor.

proper balance for efficient combustion. Ashes from the traveling grates fall through a water spray into closed hoppers and gravitate into a water-filled trench from which the ashes are carried by a conveyor and deposited in a disposal bin.

Condensing water is cooled in a spray pond 200 ft. long through the center of which runs a baffle wall. The water is thus forced to travel far enough so that in cold weather it will be adequately cooled without the operation of the sprays.

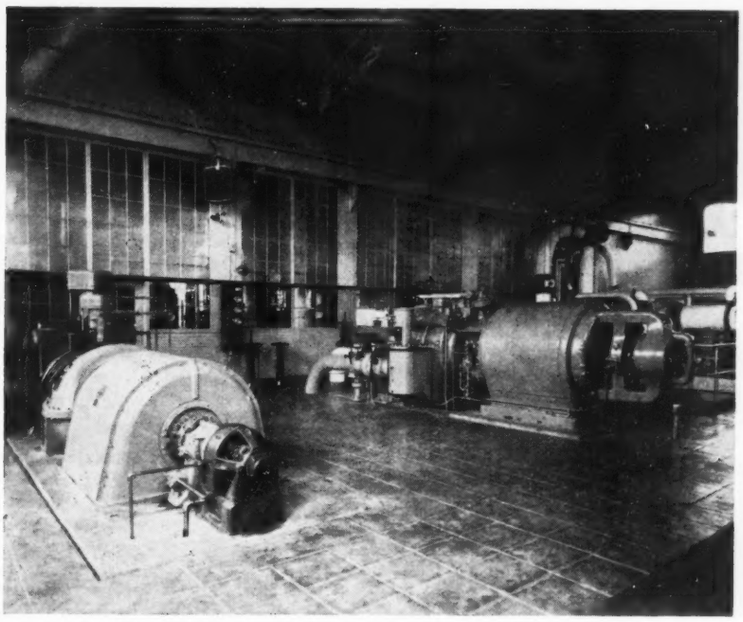
Oily exhaust steam from the hoisting engine and other low-pressure equipment is returned to the power plant and passed through a closed feed-water heater. The oil-contaminated condensate from this heater and from the breaker return line is purified in an oil filter and reused as boiler feed. Heat from a continuous boiler blow-down is reclaimed in a closed exchanger. Final conditioning of feed-water takes place in a vent condenser and a deaerating heater.

Control and instrument equipment of the plant is in line with the modern features of the main units of equipment. Individual boiler-gage boards carry draft gages, steam-flow meters, CO_2 recorders, and steam and flue-gas thermometers of graphic type. The electrical switchboard is composed of an assembly of General Electric cubicles.

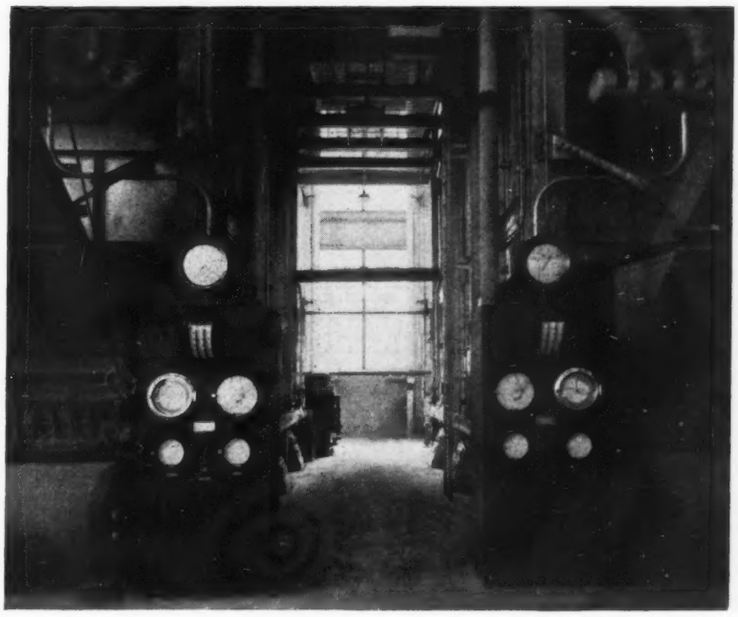
Power generated at 2,300 volts is stepped up to 11,000 volts for transmission to other mines of the company. Transformers include three 500-kva. single-phase units situated under a steel switching and distributing tower built adjacent to the engine room. Three 100-kva. 2,300/-400-volt transformers similarly situated furnish power to local motors.

Boiler- and engine-room structures are built with steel frames and brick walls. The stack, built of radial brick by the Rust Engineering Co., is 9 ft. in diameter at the top and 230 ft. high. General engineering and construction of the plant were handled by the H. W. Wilson Co., of Philadelphia, Pa., following the preliminary plans worked out by Frank Becker, then research engineer, and A. B. Jessup, then vice-president, of the Jeddo-Highland company.

In service the plant is fulfilling all expectations, and the savings being effected will retire the investment within such a period that the plant will fully justify the outlay. Since the original plant was built, a half-mile steam line to a near-by shaft has been constructed, thereby displacing another hand-fired plant, adding to the steam load of the plant erected in 1934 and increasing the over-all savings.



The 1,250-kw. new unit in the foreground is of smaller dimensions than the older-design 1000-kw. unit in the background.



Boiler instruments are grouped on control panels.

Notes . . . FROM ACROSS THE SEA

RUSSIA'S most important coal field is the Kusniezkbassugolye, "ugolye" meaning coal, Kusniezke being the name of the district, and "bass" meaning basin, but the first part of the word commonly is abbreviated to Kus and the deposit is designated Kusbass coal, declares V. Sommeregger in *Schlägel und Eisen*. It is located about one-third of the distance between the range separating Russia-in-Europe from Siberia (the Ural Mountains) and the Pacific Ocean and contains a total of 486 billion short tons, or about as much coal as can be found in the combined areas of Pennsylvania, both anthracite and bituminous; West Virginia and Illinois.

A comparison of the tonnage per square mile producible from the Kusniezk field with that of the most productive United States coal regions shows the former field well in the lead. Possibly the Siberian field might make an even better showing if figures as to depth and thickness of included measures were on the same basis in both cases, for the Siberians regard a seam under 3½ ft. as unworkable and the figures for American seams include all bituminous and higher-rank beds of 14 in. thickness and over, all sub-bituminous coal 2 ft. thick and over and all lignite 3 ft. thick. No coal more than 3,000 ft. deep is included in the United States figures. Some of this coal is "probable" coal and not a "known" resource.

TONS PER SQUARE MILE BEFORE MINING

District	Short Tons
Kusniezk	78,650,000
Pennsylvania anthracite	43,750,000
Washington	35,488,100
Wyoming	30,044,700
Utah	25,600,700
Colorado	22,128,600
North Dakota	20,249,700
Maryland	17,676,900
Virginia	11,394,200
Montana	9,892,600
West Virginia	8,973,200
Indiana	8,161,700
Kentucky	8,129,700
Alabama	8,070,000
Pennsylvania bituminous	7,897,700
Ohio	7,422,400

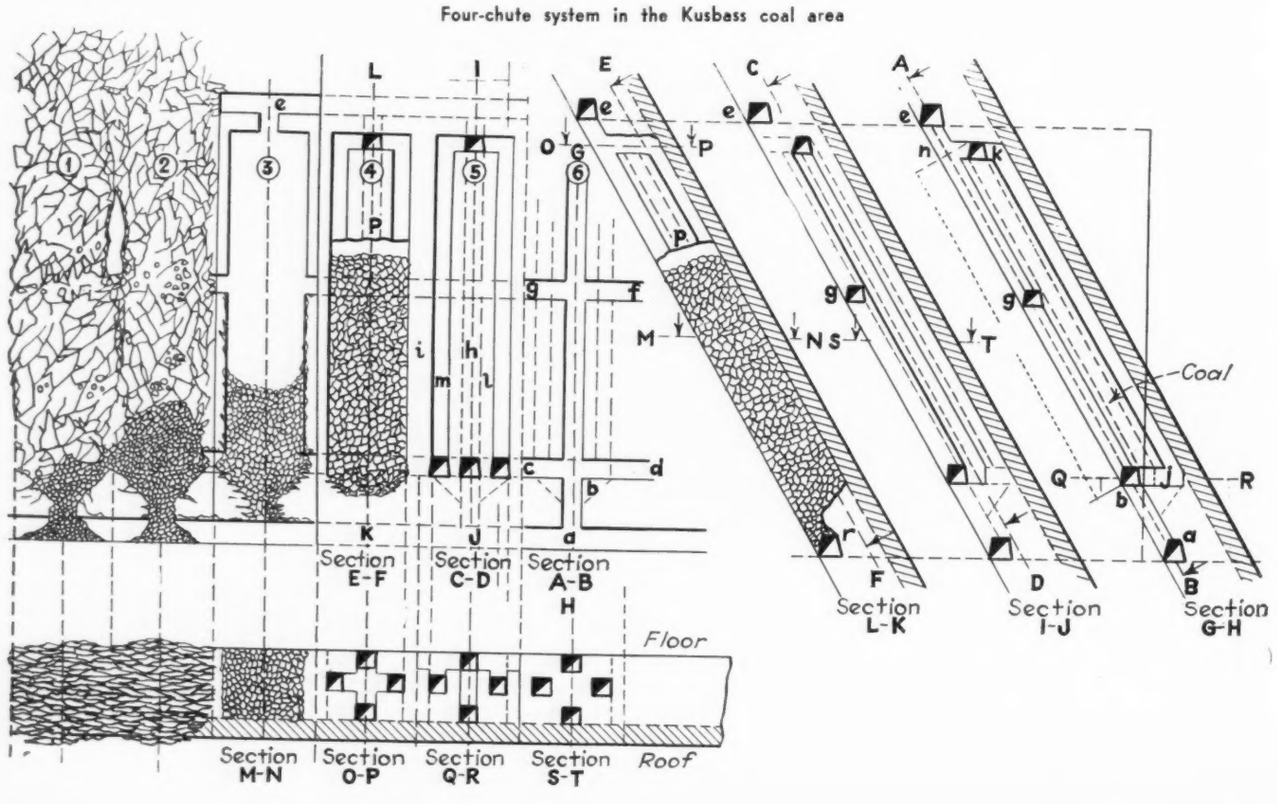
The Kusniezk coal field is being developed rapidly by the Union of Soviet Socialist Republics to displace in part the production of the Donetz field in Russia, which has only 88 billion short tons, a little over a fifth as much coal. The Donetz coal has 10 to 17 per cent of ash, and its calorific value is only 10,800 to 12,600 B.t.u. per pound, whereas the Kusniezk coal in ultimate analysis seldom contains less than 80 to 86 per cent of carbon and rarely more than 0.5 to 2 per cent of moisture, 0.3 to 0.5 per cent of sulphur, 4 to 4.6 per cent of hydrogen, and 3 to 7 per cent of ash. Calorific values vary from 12,600 to 14,400 B.t.u. Most of the coal can be coked, but the best coal comes from the Prokopievsk district, "the Pearl of the Kusbass," to the extreme south of that coal field.

For the thick seams, four chutes are driven, two chutes up the center of the block of coal in which a breast is ultimately to be developed, one over the other, and two side chutes in the center of the bed, leaving temporarily a piece of unmined coal between them for early mining. The use of a chute above and a breast below has been adopted by one American anthracite company, but the "four-chute method" does not seem to have been tried in this country; at least it has escaped the textbooks.

In the preliminaries to the extraction of coal, a method is used in a degree like that well recognized in the heavily pitching anthracite beds of Pennsylvania. As in the accompanying illustration, chutes *ab* at 32- to 40-ft. centers are started up the pitch from the gangway, as in Pennsylvania anthracite mines, and extended to the monkey heading or aircourse, *cd*, perhaps 33 ft. above it. This chute, which is about 8 ft. high and will be termed the "lower chute," is extended further 65 to 150 ft. to the level above, marked *e*, and crossheadings (crosscuts) *f* and *g* driven in the coal on the strike on either side to cut into adjacent chutes. As the chutes are relatively short, only one pair of such crossheadings is driven. Thus far, all this accords in almost every detail with Pennsylvania anthracite practice.

From the aircourse *ab*, a level cutback, *bj*, is driven toward the roof, but it is stopped short of the rock, for the upper chute must have a thick layer of coal above it to protect it from roof falls. This "upper chute" is driven straight up the pitch from *j* immediately over the lower chute but separated from it, as al-

Four-chute system in the Kusbass coal area



ready stated, by a heavy bench of coal. This chute is extended to *k*, where a level cutback is made to the lower chute at *n*. From *b*, headings about 16 to 35 ft. long are driven on the strike, and from these, at appropriate distances, are driven at right angles, on the level, two short level cutbacks to the center of the worked portion of the bed.

From the ends of these two cutbacks, chutes are driven on the pitch, to form the outer edges of what will later serve as a pitching chamber. These might be termed "side chutes." They are driven until they reach the elevation of the cutback *nk*. Thus all the chutes, except the lower one on the floor, are entirely surrounded by solid coal. The chamber which is now to be formed with these four chutes as means of approach will be 22 to 30 ft. wide and of a height a little less than the thickness of the coal; and the width of the pillar between chambers, the exterior pillar, will be about 10 ft., though it may be made more if the seam is thicker than 32 ft.

As provision for ventilation and escape is provided above, removal of the interior pillars of the pitching chamber starts just above the battery and is extended to *p*, the coal being drawn out slowly enough to keep under the workers in the extraction of the pillars. The stored coal supports the walls until the point *p* is reached.

Then the men leave, and all the loose coal is withdrawn, and with it may come (1) the coal slab left over the upper chute and over the adjoining extracted interior pillars, (2) the remainder of the coal slab between the lower and upper chutes, (3) perhaps also the coal between the cutback *nk* and the level *e*, and (4) pillars left to protect that level, as also (5) the exterior pillar between the pitching chambers.

But the rock may so outstrip the coal in reaching the battery that much of the coal from these five sources will be lost. The total losses run between 40 and 50 per cent, and fires add to the difficulty. Early in the operations the bottom of the breast is converted into a four-direction hopper so as to bring all the coal freely to the battery *r*.

Unfortunately, the coal seam, as stated, is disposed to ignite, whether by reason of its excess thickness, as Dr. Sommeregger suggests, or, as it impresses the undersigned, because of the basicity of the ash. In the middle of the southern part of the trough, the conglomerates, sandstones and lesser coal measures of Jurassic age, which cover the Carboniferous coal measures being mined, are intersected by basalts and diabases which are strongly basic rocks. The more northern fields, which are not so intersected, do not fire spontaneously, but in favor of Dr. Sommeregger's explanation is the fact that they are also far less thick.

Because of these fires, the four-chute system of working may give place in the thick seams to a German system of stowing—perhaps hydraulic stowing. With stowing, a greater percentage of extraction will be obtained, and it is hoped spontaneous combustion will be prevented, especially in the thicker beds, which sometimes have a 50-ft. cross-section.

R. Dawson Hall

On the ENGINEER'S BOOK SHELF

Requests for U. S. Bureau of Mines publications should be sent to Superintendent of Documents, Government Printing Office, Washington, D. C., accompanied by cash or money order; stamps and personal checks not accepted. Where no price is appended in the notice of a publication of the U. S. Bureau of Mines, application should be directed to that Bureau. Orders for other books and pamphlets reviewed in this department should be addressed to the individual publishers, as shown, whose name and address in each case are in the review notice.

Performance of a Baum-Type Coal-Washing Jig, by H. F. Yancey and M. R. Geer, U. S. Bureau of Mines. R. I. 3371, 18 pp., with 4 figs.; paper, mimeograph.

Cleaning work accomplished by an 80-t.p.h. McNally-Norton Baum-type jig, washing 100 t.p.h. of 3-in. Roslyn-bed screenings at No. 1 mine of the Roslyn-Cascade Coal Co. at Ronald, in eastern Washington, is described in this report. Power required is 0.35 hp. per ton of coal treated and about 1,700 gal. of water per minute, or 4.2 tons of water per ton of coal. This coal contains less than 1 per cent sulphur but much shale and clay.

The authors define the specific gravity of separation as that of the material which is distributed equally to washed coal and refuse. The 1.40 to 1.60 specific-gravity fraction of the feed as a whole found its way to the coal discharge and the 1.60 to 1.80 fraction principally went to the refuse. The particles of a certain specific gravity in the range between 1.40 and 1.80 must have been distributed equally between the two products. Thus the specific gravity of separation lies between 1.40 and 1.80 and the exact point about which the fraction if equally distributed is found, by interpolation on a distribution chart, to be about 1.53 specific gravity.

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Explosion Waves and Shock Waves: V—The Shock Wave and Explosion Products From Detonating Solid Explosives, by W. Payman and D. W. Woodhead. Cambridge University Press, Cambridge, England. 18 pp., with 6 pp. of cuts; paper.

This excerpt from the Proceedings of the Royal Society of London describes and illustrates photographic records of the atmospheric disturbance produced when a cartridge of coal-mining explosive is detonated when freely suspended in air. Two explosives were used, both containing sodium chloride to cool the heat of reaction, one 6 to 8 per cent and one 19.5 to 21.5, and so not perhaps quite representative of our own, which are not so cooled. The detonation phase lasts about 3×10^{-5} seconds and the disturbance is nearly spherical. In the next phase, particles appear in the wave front, and the gaseous expansion from the end of the cartridge is far more vigorous than that from the side. Eventually the wave becomes smooth and of spherical form.

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Epuration, Séchage, Agglomération et Broyage du Charbon, by C. Berthelot. Dunod, Paris, France. 393 pp., 5¼x8¼ in. Bound, $3.80; paper, $3.24.

This publication discusses cleaning, drying, briquetting and crushing of coal. Birtley, Revelart-Berry, Meunier, Soulary and P.I.C. are the types of air table described. Thereafter follow the Lessing, the Ougrée-Marihaye-Maurice Bertrand, Chance and deVooys cleaning methods. Flotation methods described are the Le Chatelier-Pic and Minerals Separation. Space does not permit reference to the crushing, flotation, drying and briquetting methods described.

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Performance of a Pulsator-Type Coal-Washing Jig, by H. F. Yancey, M. R. Geer and R. E. Shinkoskey, U. S. Bureau of Mines. R. I. 3372, 19 pp. with 5 figs.; paper, mimeograph.

This report records the cleaning work performed by two 60-t.p.h. Vissac jigs washing 1¼x¼-in. nut and 3x1¼-in. egg Roslyn-bed coal respectively from No. 3 mine of the Northwestern Improvement Co. at Ronald, in eastern Washington. Less than 0.1 hp. was used and 1,850 gal. (7.7 tons) of water per ton of coal treated, more water being needed for washing egg and less for cleaning nut coal. The same method of finding the "specific gravity of separation" was used as in R. I. 3371; the dividing specific gravity for egg was 1.45 and for nut 1.69.

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Carbonizing Properties and Petrographic Composition of Millers Creek Bed Coal From Consolidation No. 155 Mine, Johnson County, Kentucky, and the Effect of Blending Millers Creek Coal With Pocahontas Bed and Pittsburgh Bed (Warden Mine) Coals, by A. C. Fieldner, J. D. Davis, R. Thiessen, W. A. Selvig, D. A. Reynolds, G. C. Sprunk and C. R. Holmes, U. S. Bureau of Mines. T. P. 572, 50 pp.; paper. Price, 10c.

Millers-Creek coal produces a weak coke with a cell structure like that from high-volatile B and C coals, although it is definitely of high-volatile A rank. Its deficiency in coking properties is not due to its splinty character, as the splint layers have higher agglutinating values than the bright-coal layers. Its coking properties are much improved by blending either with a high-volatile A or with a low-volatile standard blending coal. With the former, strong, well-fused cokes are formed, and with the latter poorly fused but equally strong cokes.

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OPERATING IDEAS

From

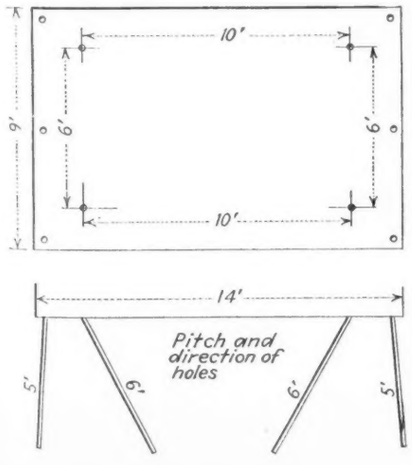
Production, Electrical and Mechanical Men

Putting Down New Shaft Shows Sinking Kinks

Fresh from putting down a new shaft, Alex H. Bennett, Springfield, Ill., offers a number of kinks drawn from that experience. The drillhole log, says Mr. Bennett, showed nothing unusual—no quicksand and only a modest quantity of water. Depth of the shaft was 256 ft. and the materials encountered were mostly surface soil, shales, clay and shale conglomerate, and slate. A 12-in. seam of coal was encountered at 80 ft. and a 30-in. seam at 185 ft. Eight feet of limestone was struck at 200 ft. and the coal top at 244 ft. A sump was dug out under the main seam 6 ft. to another limestone of indeterminate thickness. While the limestone was feared as a tough problem, actually more trouble was encountered in the sticky, aqueous formations "than a mile of clinky limestone" could offer.

Experience on the job, declares Mr. Bennett, makes it worth while to reiterate that the proper use of the throttle valve of a compressed-air drill is the key to speedy, labor-saving progress. It is especially true where the air pressure is low and the ground is alternately hard and clayey in character. "As any one familiar with an air drill knows, the hole in the drill steel is intended to conduct air down to the bottom of the hole to blow out the drillings. So it is imperative to keep air going down the drill steel at all times. Where the holes are dry or it is possible to dam off the water, drilling then becomes simply a matter of bearing down and dodging the cuttings as they come out of the hole.

Fig. 1—Hole placement in sinking operations.



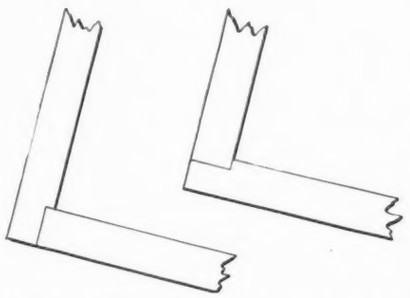


Fig. 2—Showing the use of simple notches alternately in the end and wall plates.

"Where the holes are wet, headwork and considerable skill are required to keep the holes from clogging, and the following plan worked nine out of ten times in mixed clay and gravel. It involved, after inserting the new steel in the drill, first turning the air down through the steel to see if it was clear. Then drilling was started, merely directing the bit without pressure. Every 6 in. or so, the drill was shut off, leaving the air blowing through the steel, and then the steel was pulled to the top of the hole three or four times to clean it. When a wet hole was drilled, care was taken to see that it was plenty wet by keeping a stream of water pouring into it, thus materially reducing the chance of clogging the drill steel or sticking it in the hole.

"That this method has a definite dollars-and-cents value was shown by the fact that earlier there was more than one entire shift, with four men working, when not a hole was completed because of stuck steels. The above plan was developed only after careful experimentation. An idea of its effectiveness can be gained from the fact that we found it readily possible thereafter to drill five 6-ft. holes and eight 5-ft. holes in an hour ready to shoot.

"In slate and shale the blasting plan yielding best results was to drill four 6-ft. holes 6 ft. apart the short way of the shaft and 10 ft. apart the long way of the shaft (Fig. 1), supplemented by six 5-ft. bench holes. The sump holes were angled inward about 30 deg. Five sticks of 60-per-cent dynamite in the sumpers and three sticks in each bench hole gave excellent results."

Sinking was done with the conventional headframe and three 110-gal. buckets in conjunction with a truck with swivel grooved lugs to facilitate dumping the spoil. A non-rotating rope was supplemented by guides. Only seepage water was encountered the first 100 ft. gradually increasing to about 2,000 gal. in 24 hours. No pumping was necessary except on week-ends, so that bailing could be dispensed with from Saturday to Monday morning.

Shaft size was 13x8 ft. inside the timbers. For the first 85 ft. 6x8 creosoted pine sets were used, followed by 3x10 plain pine (also for buntons) the rest of the way down. A simple 2-in. notch 6 in. from the end was used alternately in end and wall plates, and plain 1-in. pine boards were employed in the curtain wall.

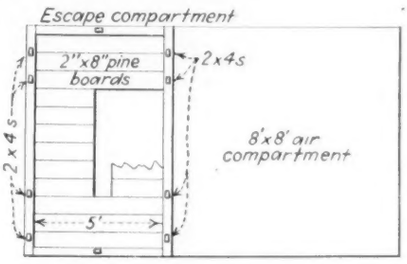


Fig. 3—Showing use of perpendicular 2x4s in construction of the stairway in the escapement compartment.

One departure from what might be termed the conventional timbering system is noted by Mr. Bennett. That consisted of installing timber sets every 6 ft. of sinking, as it was found that when more than 6 ft. had to be timbered at a time the sets could be raised into place only with difficulty and once not at all. On the other hand, taking 6 ft. at a time, the timbering could be done speed-

ily and could be placed in perfect alignment a few minutes after the sets were placed. Four jacks were used simultaneously. When over 6 ft. had to be timbered, it was necessary also to scaffold—a time and timber-wasting procedure. Furthermore, although the shaft walls seemed solid, the action of the water caused the sides to slough off, creating a decided hazard unless the timbering was kept close up with the sinking. Timbering every 6 ft. of sinking seems to be the best bet from the standpoints of safety and efficiency, Mr. Bennett believes.

Horn sets were placed at distances varying with the nature of the strata but not over 15 to 25 ft. apart. Again the air drill proved a time and labor saver. Four 2-ft. holes were slanted to the point where the horn sets were to be placed, and making the required 18-in. ledge presented no difficulty. Air was supplied by flexible tubing and the curtain wall was kept as close to the sinking level as practicable. Guides were kept within 20 ft. so that the bucket reached the follower soon after leaving the working level, thus permitting hoisting speed to be increased without endangering the men below. Otherwise, it would have been necessary to slow down the bucket to take the follower. The record hoist was 85 buckets in addition to drilling and shooting eight holes for the next shift—an average of a load every 4 minutes at 200 ft.

Another point that developed in the course of the work involved handling explosives. Originally, preparing the charge for shooting consisted of wrapping the required number of sticks of dynamite in a paper cartridge. But difficulty in getting the charge in place where silt was continually washing into the hole resulted in a change to leaving the sticks loose and placing them individually, first the stick with the cap and then the rest, finishing off with tamping with clay dummies to the mouth of the hole. The two wires for each hole were connected directly to the main firing cable. Connecting the wires from hole to hole was not entirely successful, as several misfires developed—for reasons that were difficult to determine.

A departure from the usual practice was adopted in building the stairway in the escape compartment. Instead of spiking the 2x8s to the walls for each landing in each flight of steps, five 2x4s were first spiked to the walls perpendicularly, after which the box for the landing boards was nailed to these uprights. Thus, the escapement stairway was not directly attached to the walls of the shaft. This makes it possible to remove and replace wall and end plates without having to remove the stairway sections.

"Time required to complete this airshaft, from the first removal of ground to the completion of the stairway in the escapement compartment, was 66 days of three 7-hour shifts each," Mr. Bennett states.

Swamper

● Clearing the trail for the teams hauling the logs by cutting away the underbrush, fallen timber and other obstacles is the job of the swamper in the logging industry. His task is not spectacular but yet it is important for smooth, low-cost operation. The Operating Ideas Department of Coal Age might be said to function to the same end: smoothing the path of operating, electrical, mechanical and safety men in the coal industry by offering selected examples of methods of reducing cost, increasing efficiency, or promoting safety. We solicit your assistance in this activity in order that we may render the maximum possible service. So if you have developed a worth-while short cut, send it in, along with a sketch or photograph if it will help to make it clearer. The reward for each acceptable idea is at least $5 from the editorial staff of Coal Age.

Hints From a Shopman's Notebook: Bending Bumper Irons

By WALTER BAUM
Master Mechanic, Perry Coal Co.
O'Fallon, Ill.

USING scrap rail and other material on hand in the shop, the jig for bending mine-car-bumper irons described below was constructed when orders for several hundred irons of this type came in. Four of these irons (Fig. 1) are used on each car, or one on each corner. The irons, as indicated in Fig. 1, were cut from ⅝x12-in. plate 16 ft. long without waste except for the corners, using a sample iron as a model in both cutting and designing the jig.

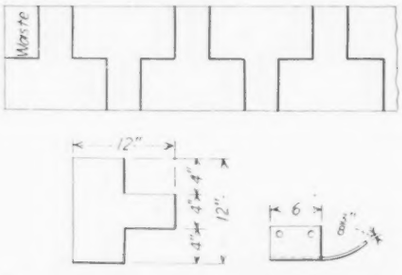


Fig. 1—Showing, above, method of cutting bumper irons out of plate without waste except in corners; below, left, shape of iron before bending; and below, right, bumper iron after bending and drilling.

The jig itself consists essentially of three parts: the base, which also serves to form the iron; a top clamping member to hold the iron while it is being bent; and three lever-type bending members. The bending members are hinged to an intermediate member (Fig. 3) made of 1½-in. plate, which in turn is bolted to the front end of the clamping member as shown in Figs. 4, 5 and 6.

Base and clamping members were made of scrap rail. To hold the jig on a welding table while bending, two short pieces of plate (Figs. 4 and 6) were welded to the base member. Steel filler blocks were bolted in the base member at the points where the side members of the irons are bent to act as stops when bending is completed. The clamping member is attached to the base member by means of a pin (Fig. 2) made from a crankpin from a Joy 11BU gathering-arm disk machined as shown. The shape of the pin permits the clamping member to tilt forward when the clamping screw at the rear end is run down to hold the hot iron for bending. The pin also permits the clamping member to be turned to one side, as in Fig. 6, to free the iron after it is bent.

The clamping screw (Fig. 3) works in a nut to which a short piece of tubing is welded, after which the assembly is welded to the back end of the rail forming the clamping member. Adding the tubing lengthens the weld and increases the strength of the attachment. The bottom

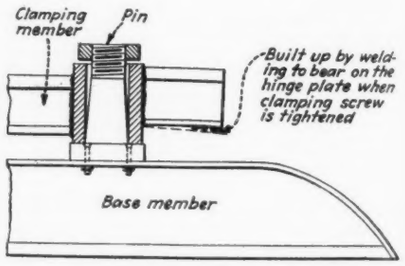


Fig. 2—Showing pin used to attach clamping member to base member.

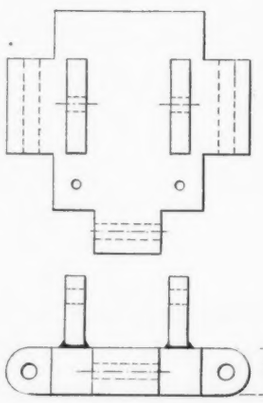


Fig. 3—Intermediate member to which bending members are hinged.

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STEAM CYLINDER OIL

cut oil consumption in half at this plant

"We NOT only solved the problem of oil carryover in the exhaust steam, but StanoCyl reduced oil consumption about 50%."

This experience at a northern paper mill is typical of StanoCyl installations. This plant operates four 24 x 48 Corliss engines. The immediate problem was the elimination of excess oil in the exhaust steam used for heating. This oil was fouling the system and causing considerable maintenance trouble. StanoCyl "D" was recommended to remedy this condition.

Under the supervision of a Standard Lubrication Engineer this oil was installed and oil feed gradually reduced. Finally, when oil carryover had been practically eliminated, it was found that oil consumption had been *cut in half*. Inspection of valves and cylinders, however, showed excellent lubrication. Solving the maintenance problem had brought an even greater saving in actual oil costs.

There is a definite reason for the low consumption records of StanoCyl. With its more complete atomization, less oil is required to reach and lubricate even remote engine parts. It clings to cylinder surfaces longer, again reducing the amount of oil required for adequate lubrication. Let a Standard Lubrication Engineer demonstrate these facts on your engines. Let your cost records prove them. Call your local Standard Oil (Indiana) office or write 910 S. Michigan Ave., Chicago, Ill.

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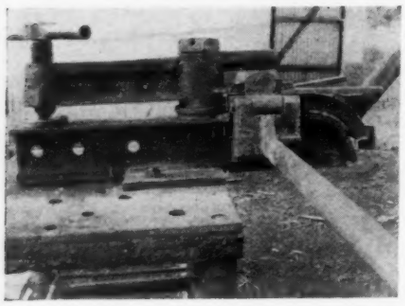


Fig. 4—Bumper iron bent and ready for removal from the jig.

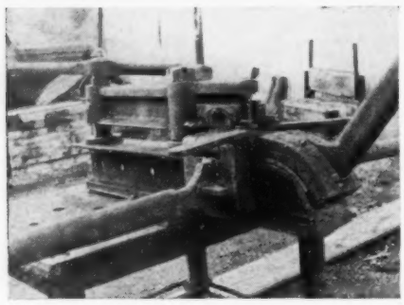


Fig. 5—Another view of jig after iron is bent, showing side and front bending members.

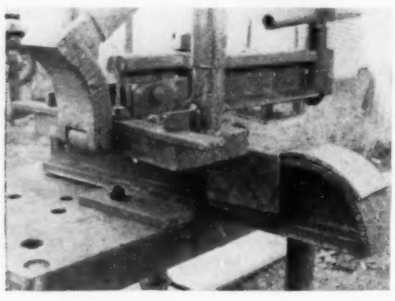


Fig. 6—Bending members raised and swung to one side to permit removing bumper iron.

of the clamping screw is tapered to fit a recess in a washer on the back end of the base member (see Fig. 3), thus making it possible to line up base and clamping member automatically.

One front and two side bending members are employed and, as indicated above, are hinged to the intermediate member, which in turn is bolted to the clamping member. The bending members are equipped with handles to provide the necessary leverage. Latches (Figs. 4 to 6) are bolted to the intermediate member to hold up the two side members when not in use. These latches fit in catches welded onto the bending members as in Fig. 6.

In bending, two helpers were employed in addition to myself. Thus, there was one man for each bending member. The bending members are raised and a bumper plate, heated white hot in an oil furnace, is placed in position on the base member. The clamping screw is run down, bringing the front of the clamping member down on the iron to hold it fast. The latches then are pulled forward to release the side bending members, after which all three bending members are brought down to form the iron. The bending members then are raised and the clamping screw is slacked off to allow the clamping member—carrying the bending members—to be swung to one side to permit the removal of the bumper iron. The jig then is ready for another operation.

Bit Basket Dumped As It Is Lowered

Handling machine bits in the sharpening plant at the Standard mine of the Standard Coal Co., Wheatland, Ind., includes a convenient arrangement for dumping the perforated basket which catches the bits when they fall into the quenching solution after traveling 10 ft. on a conveyor chain from the roller sharpener. An electric hoist with push-button control moves the basket from the quenching tank to the draining screen. This basket, Figs. 1 and 2, has a bottom which is divided into halves which are hinged at the center. Lifting chains passing through rings welded to the sides near the top terminate at a ring into which the hoist rope is hooked for lifting the load out of the oil tank (Fig. 1). After the basket (Fig. 2) is swung over the drain board the bail is placed over the hook on a stationary cable tied to the rafters and the hoist is lowered. Thus the body of the basket is held stationary and the doors open to empty the bits.

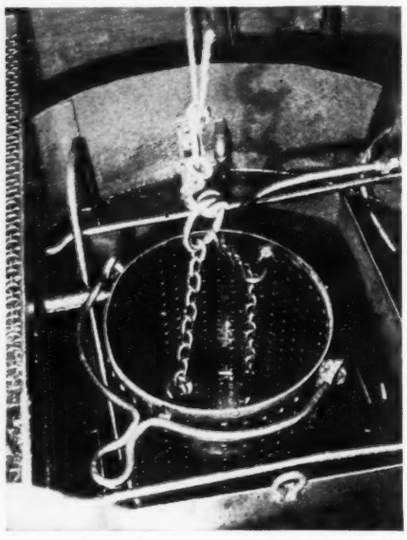


Fig. 1—The bail is not in use and the basket is being hoisted by chains attached to the hinged doors at the bottom.

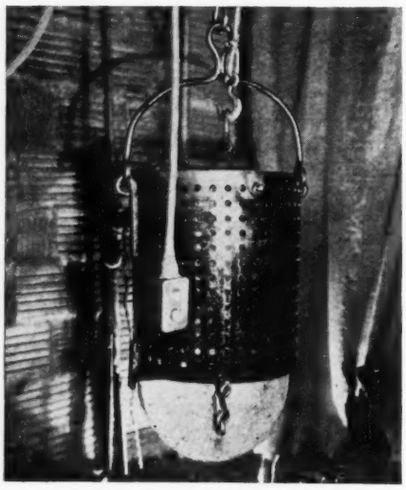


Fig. 2—Above the drain board the bail is hung on a stationary hook and the hoist cable then is lowered to allow the doors to open by gravity.

Eighteen Years of Tire Welding Confirms Clearfield Savings

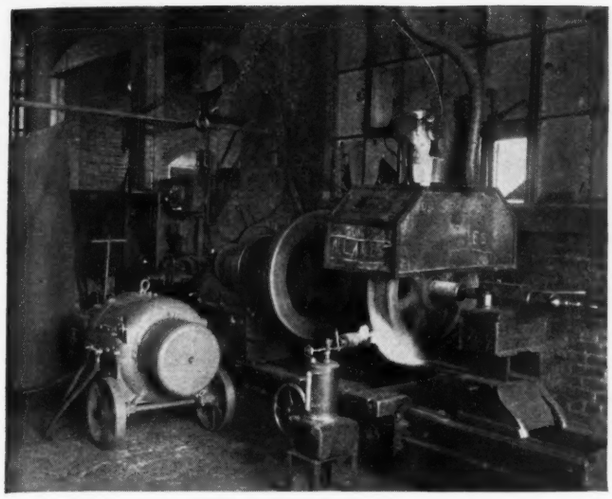
Use of a larger machine and a larger electrode of higher carbon content are the most recent developments in eighteen years of arc-weld tire filling at the Clymer (Pa.) shop of the Clearfield Bituminous Coal Corporation. Beginning in 1921, the company tried tire filling by hand-operated arc-welding and found it profitable. That method was practiced consistently until 1930, when an automatic welding head was purchased. In 1931, when this automatic tire filling was described in *Coal Age* (p. 262, May, 1931), an attractive saving was being made and the breakage difficulties encountered at first with automatic welding had been solved by fitting the tires with shrinkage allowances ample to keep them on but not so great as to cause undue tension.

Before this recent change in automatic welding practice 3/16-in. electrode wire of 0.13 to 0.18 carbon was used. After purchase of a larger machine ¼-in. electrode of 0.50 to 0.60 carbon was adopted. The higher current and resulting higher heat with this electrode burns away a much higher percentage of the carbon. The weld or fill made with this larger electrode with higher carbon appears, however, to have about the same hardness as that made with the smaller electrode of lower carbon. The aim is to secure a weld of the maximum hardness that can be turned in a lathe.

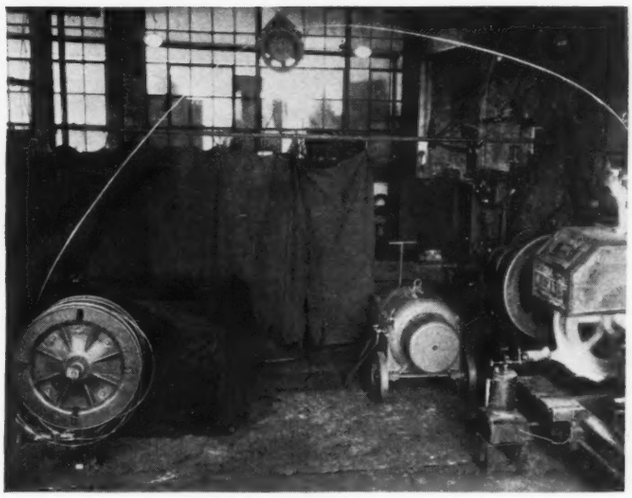
The new welding machine is a Westinghouse "Flexarc" unit rated at 400 amp. and driven by a Type CS 220-volt motor. The welding head is the original Westinghouse unit which has been in constant service since its purchase in 1930. It was fitted, however, with a metal canopy shield with colored glass window to supplant the earlier protection afforded by a circular asbestos curtain.

Preheating with a gasoline torch is carried on all of the time that a tire is being welded. In a 7-hour shift, during which the normal welding accomplishment is two 25½-in. tires, between 3 and 4 gal. of gasoline is consumed. Plans are under way to supplant this gasoline torch with a torch consuming kerosene or fuel oil. Tires are not annealed before or after welding.

Shrinkage allowances for the various



A new 400-amp. arc welder (left) supplies current to the automatic head. The torch is kept on the tire during the entire welding time.



The reel of electrode wire (at left) is mounted close to the floor in the Clymer shop so that refills can be handled conveniently and safely.

tires now in use on the company's locomotives are given in Table I, in which all dimensions are in inches. These allowances are for tires which have been bored to a relatively smooth finish. Some years ago when the relation of this feature to tire breakage was being investigated it was found that ridges left carelessly during the boring of tires, especially next to the shoulder, were responsible for excessive tension after shrinkage onto the wheel center.

Table I—Sizes of Tires and Wheel Centers

Tires				Diameter of Wheel Center	Shrinkage Allowance
Width	Thickness	Diameter	Bore		
5	2½	25½	20.478	20½	0.022
5	2¼	29	24.474	24½	0.026
5	2¼	31 1/16	26.534	26 5/16	0.0285
5	2¼	34 1/16	29.531	29 5/16	0.315

The electrical engineering department of the coal company visions the development of an automatic cross-feed reset as an auxiliary to the automatic welding equipment. It would eliminate that close attention now required toward the finish of a layer and the manual shifting and adjustment to start the welding of the next layer.

How to Hold Small Parts For Free-Hand Grinding

Free-hand grinding of small parts usually is difficult to accomplish with any degree of satisfaction, partly because the fingers are too close to the wheel for safety and partly because of the heat built up in the part itself, declares John E. Hyler, Peoria, Ill., in detailing some methods of doing the job to better advantage. One of the most difficult operations is face-grinding a small part by holding it to the side of the wheel. One way of facilitating such grinding operations is to take a block of wood, lay the part to be ground upon it and then drive a few brads around the edge to hold the part solid. The resultant holder permits pressing the part snugly against the side of the wheel with safety and comfort. If the part is of such a shape that it will not lie flat against the block, a recess may be chiseled out to receive it. If a piece of very soft wood, such as balsa or cork, is available, the part often can be almost pressed in in a vise or hand press, with just a touch of chisel work to finish the job.

Many parts, even though small, can be held for free-hand grinding by clamping them in an ordinary wood-jawed handscrew, and such a tool is a convenient accessory which may be kept hanging at the wheel stand. Parts can be fastened in the handscrew in various positions for the greatest convenience in grinding. An interesting method of holding cylindrical parts, such as small pins, when it is desired to revolve them against the wheel for making a circumferential groove, producing a conical point, etc., is to place them in a standard three-jaw drill chuck. A chuck with a tapered shank is best, as such a shank makes an excellent handle. The ease with which a modern chuck with a knurled sleeve may be opened and closed to hold or release the work makes it a good accessory at any odd-job grinding wheel.

Correcting the Record

In the interests of clarity, E. A. Smith, chief engineer, Central Elkhorn Coal Co., Estill, Ky., points out that the item on "Retarder Prevents Shock in Making Trips" (November, 1938, *Coal Age*, p. 56) should be modified to make it clear that the retarder in question (designed for use on mine cars) should adjust the position of the link on the car so that it would be well out of the way of the next car. Derailments, Mr. Smith states, sometimes result when a link hangs too low or otherwise gets between the bumpers of two cars at the time they come together.

Water Sprays in Mine Portal Arrest Tipple Dust

Water sprays installed at the portal of the haulage slope at the MacBeth (W. Va.) mine of the Hutchinson Coal Co. have proved effective in preventing coal dust being carried into the mine from the tipple. A measure of the success of the sprays is the fact that formerly the weigh boss at the bottom of the 650-ft. slope had to wipe the coal dust from his weight sheet every trip, but now needs to do it only two or three times per shift. Keeping this fine dust out of the mine means less rock-dusting expense and greater safety.

The slope is the principal intake for ventilating the mine and the volume entering is 100,000 c.f.m. Six tree-type "Mist" spray nozzles are installed in a row across the top of the portal. In cold weather this spray has the additional function of humidifying the intake air, thus reducing drying in the mine.

Adjustable mist nozzles are used.

Six sprays curtain the entrance.

A tipple of a low type in which the picking tables are at ground-floor level and close to the mine portal is responsible for the presence of dust where it is likely to be drawn into the mine. One end of the five-car rotary dump is only 50 ft. from the concrete portal.

Several Methods Available For Cleaning Goggles

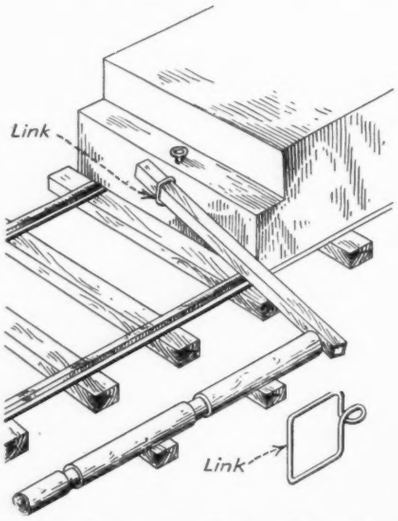
With constant usage safety goggles will get dirty just like any other article of wearing apparel. To protect workmen whose skins may become irritated or infected by dirt or other foreign matter, the American Optical Co. suggests that goggles be thoroughly cleaned and sterilized at stated intervals and recommends the following methods:

1. Wash the goggles in a hot solution of soap and water. Scrub the eyecups, lens rings and side screens with a stiff brush. If the goggles are spotted with paint or tar, a 10-minute soaking in a solution of varsol will clean the surfaces. Next, soak the goggles for 30 minutes in a 3-per-cent cresol solution and hang on a support to dry.
2. Wash the goggles in a hot solution of alcoholic green soap, rinse in warm water and hang up to dry.
3. Simply immersing the goggles in boiling water for 5 minutes has been found an effective method of sterilizing them.
4. Soaking the goggles for 10 minutes in a solution of formalin made by placing one part of 40-per-cent formaldehyde solution in nine parts of water is another simple and practical sterilizing method.
5. Scour the goggles to remove all dirt and then expose them 5 minutes to ultraviolet light. This usually is done in the first-aid room or emergency hospital, where such equipment, if installed, generally is placed.
6. Another method of sterilization is subjection of the goggles to a moist atmosphere of antiseptic gas, preferably formaldehyde, for a period of 10 minutes at room temperature.

Laying Wooden Pipe Lines Aided by Link and Bar

To facilitate the laying of wooden pipe lines in diameters of 4 to 8 in., Anthony Shacikoski, superintendent, Cochran Coal Co., Salina, Pa., suggests the use of a twisted link held in a locomotive bumper in which link a steel bar is inserted. The bar is placed against the end of the pipe lengths to be assembled and the locomotive is started up to push the lengths together.

General shape of the link is shown in the accompanying illustration. The pin



Showing diagrammatically how link and bar are used with locomotive in laying a wooden pipe line.

is run through the small loop to hold the link in the bumper, while the crossbar used for pushing is placed in the large loop substantially as shown in the diagrammatic view of the bumper end of the locomotive. The crossbar, says Mr. Shacikoski, should be about 6x5 in. The bar can and should be made plenty long for all conditions, as it is easily adjusted by pushing it through the link. The thrust of the bar while in use is taken on the corner of the bumper while the end is held in place by the link.

Laying wood lines with a locomotive and crossbar, according to Mr. Shacikoski, is safer than using hammers and mallets, which bring in the hazard of men being struck. Also, hammering may damage the ends of the pipe lengths, whereas with the locomotive only a steady pressure is exerted. In cases where the joints fit tightly, a lick with the hammer on the crossbar after pressure is applied by the locomotive will result in the pipe slipping together immediately. Pipe lengths necessarily must be moved while lines are being laid, and if two links and bars are available, the pipe can be laid on the bars for easy and convenient movement along the entry.

The speed is about four times that obtained with the use of hammers—and with fewer men. In laying an 8-in. wooden line with hammers, two men were required on the hammers, one man to hold the mallet and two more men at the joint, or a total of five. Using the locomotive, only three men are required.

Residual Welding Acetylene Used for Soldering

When an acetylene tank has been emptied to the point where the pressure is too low for cutting and welding, considerable gas remains. This can be utilized to excellent advantage in the electrical repair shop for miscellaneous heating and soldering.

In the illustration, Carl Stinnette, chief electrician at the MacBeth (W. Va.) mine of the Hutchinson Coal Co., is demonstrating the use of a small torch hooked to an "empty" acetylene welding tank. He is soldering new leads onto a field coil. This torch is a "Five-in-One" outfit made by Prest-O-Lite.

Using gas from an "empty" tank.

WORD FROM THE FIELD

Bituminous Coal Surcharges Extended by I.C.C.

Surcharges on bituminous coal, which were to have expired on Dec. 31, will be extended indefinitely beyond that date, according to a ruling released by the Interstate Commerce Commission in Ex Parte 115 on Nov. 30. In thus granting the petition of the railroads these charges virtually become a part of the permanent rate structure. A part of the Commission's decision read: "In view of the present level of railroad expenses and taxes, we find upon the whole record in this proceeding that the present rates are just and reasonable and will be for the indefinite future."

Commissioners Eastman and Lee, however, declined to concur in the majority's decision to include the Pocahontas lines in the continuance of the "emergency" charges. The dissenters assailed these lines for their "arbitrary refusal" to join in a pooling plan to share their excess revenues with other roads. But they admitted the Pocahontas carriers were correct in holding that the Commission could not compel them to join a pooling arrangement if they did not so desire.

The Commission has power to withhold approval of rate increases, they added, "if we find that they will result in unjust and unreasonable rates. Here no increase in the rates of the Pocahontas lines would be warranted save for the needs of the other railroads. That being so, the resulting rates will not, in our opinion, be just and reasonable unless the carriers concerned take such steps as the law permits to apply the increased revenue to the needs which furnish its only justification."

The majority suggested that the matter of pooling might be a proper subject for a special inquiry by the Commission.

Food Jobber Boosts Coal

Coal held the spotlight at a luncheon at Cincinnati, Ohio, on Nov. 29, sponsored by the Chamber of Commerce Forum of that city. The guest speaker, who discussed "Coal's Contribution to Cincinnati's Commerce," was D. E. Matthews, general manager of Lewis, Hubbard & Co., wholesale grocers of Charleston, W. Va. Among the several hundred business men present were W. J. Magee, vice-president, Carbon Fuel Co.; John H. Rhodes, president, Cincinnati Coal Exchange; R. E. Howe, president, Appalachian Coals, Inc.; Wayne P. Ellis, secretary, District 8 Bituminous Coal Producers' Board; F. H. Callaway, president of the local Coal & Coke Merchants' Credit Association; and James A. Reilly, vice-president, Queen City Coal Co.

Mr. Matthews showed a sympathetic knowledge of the problems of the coal industry and warmly espoused its efforts to combat the inroads of fuel oil, hydroelectric power and natural gas. Evidencing his support, it was revealed that every bill which his company pays bears the inscription "Coal Made the Payment of This Bill Possible." He also has been active in promoting cooperative effort along this line by other jobbing houses in Charleston.

To Hold Coal Symposium

A symposium on solid-fuels utilization will be a feature of the 45th annual meeting of the American Society of Heating and Ventilating Engineers, to be held Jan. 23-27 in Pittsburgh, Pa. The following papers are to be presented: "Small Stokers," Ralph A. Sherman, Battelle Memorial Institute, and Paul A. Mulcey, Anthracite Industries Laboratory; "Classification and Selection of Solid Fuels From the Viewpoint of the Small Consumer," A. C. Fieldner, chief, technologic division, U. S. Bureau of Mines; "Improvements That Are Needed in Heating Equipment," Thomas H. Urdahl, consulting engineer, and A. J. Johnson, director, Anthracite Industries Laboratory; "Performance of Stoker-Fired and Hand-Fired Warm-Air Furnaces in the Research Residence," A. P. Kratz, research professor of mechanical engineering, University of Wisconsin, and S. Konzo and R. B. Engdahl, University of Illinois.

COAL AGE was founded in 1911 by the Hill Publishing Co. In 1915 *Colliery Engineer*, with which *Mines and Minerals* previously had been consolidated, was absorbed by COAL AGE.

When, in 1917, the Hill Publishing Co. and the McGraw Publishing Co. were consolidated to form the present McGraw-Hill Publishing Co., COAL AGE became a member of this larger publishing enterprise. On July 1, 1927, the journal was changed from a weekly to a monthly.

During twenty-seven years the editorship has been held successively by Floyd W. Parsons, R. Dawson Hall, C. E. Lesher, John M. Carmody and Sydney A. Hale. The editorial staff of COAL AGE consists of: Sydney A. Hale, R. Dawson Hall, Louis C. McCarthy, Ivan A. Given, J. H. Edwards and Walter M. Dake.

Mining Congress Committees Report Progress

Officials of coal companies from all sections of the country, as well as representatives of manufacturers of mining machinery and equipment, to the number of more than 85 attended the two-day conference of the Coal Division committees of the American Mining Congress held Dec. 2 and 3 at the William Penn Hotel, Pittsburgh, Pa. In opening the meeting, Julian D. Conover, secretary of the congress, said: "The real incentive behind our Coal Division is the mutual desire of all of us to improve the coal-mining industry. The modernization movement that is becoming so evident is not just someone's idea; it is a vital necessity. For the past generation coal has faced a declining market caused by the improved technique in coal combustion and by the inroads from other sources of power, and the only way for coal to survive is through the united action of those men in the industry who are progressive, forward-looking and have made up their minds that they themselves are going to remain in business."

A resolution opposing the proposed treaty between the United States and Canada for the Great Lakes-St. Lawrence waterway was presented by R. L. Ireland, Jr., president, Hanna Coal Co. J. B. Morrow, vice-president, Pittsburgh Coal Co., stressed the need for research to develop new uses for coal and to promote more efficient methods in its combustion.

Committee Promotes Output

The work of the Coal Division committees as a means for increasing production through the development of a higher operating efficiency was approved by R. L. Cox, vice-president, Jeffrey Mfg. Co., and chairman of the board of governors of the Manufacturers' Division of the congress. Louis Ware, president, United Electric Coal Cos., emphasized the importance of making coal a more economical fuel to compete against other sources of power.

The cooperation of the operating and technical men as evidenced by the meeting of the Coal Division, said Harry M. Moses, president, H. C. Frick Coke Co., was in his mind very conclusive proof that coal would regain its former place in industry. P. C. Thomas, vice-president, Koppers Coal Co., spoke of the progress made in modernizing coal mining and said that the men in the Coal Division were contributing very materially to the advancement of the industry.

A general conference for an open discussion of the activities of the Coal Division was held in the morning of the second day. G. B. Southward, mechanization engineer of the congress, who opened the meeting, stated that the purpose of the committees is to gather and present to the coal industry data and descriptions of successful mining method, but not to try to develop standards, as there is no way

of performing any operation of mining that is equally efficient under all the varying conditions encountered. He then called on each committee, through its chairman, to present an account of the progress made in its study during the past year. These reports were submitted:

T. W. Guy, consulting engineer and chairman of the committee on surface preparation, gave a résumé of its study on dewatering methods. His committee discussed a recommendation, which it has under consideration, for a uniform procedure in determining surface moisture in coal; also a recommendation, which is under preparation, which will explain and describe what data are necessary for the proper design and selection of a screen installation. A series of studies being undertaken by the committee on underground power was outlined by C. C. Ballard, New River Co., chairman of the committee.

A set of forms recommended by the committee on conveyor mining for daily reports on conveyor operations was submitted by T. F. McCarthy, Clearfield Bituminous Coal Corporation, chairman. The purpose of these forms is to furnish a convenient manner of recording the items in labor and material that must be considered in determining cost or performance efficiency. Newell G. Alford, consulting engineer and chairman of the committee on mechanical loading, submitted a set of forms recommended by his committee for making time studies and summarizing the results and for keeping daily section reports on the operation of mobile loading machines.

A series of reports prepared by the committee on haulage roads and recommended for publication in booklet form was presented by R. V. Clay, vice-president, Hanna Coal Co., chairman. These reports cover various phases of main-line track, and the booklet will present in clear and concise form the fundamentals as well as the details of modern coal-mine-haulage road construction and maintenance.

J. J. Sellers, Virginia Iron, Coal & Coke Co., chairman of the committee on safety, outlined the progress of his committee in preparing a set of standard mine safety rules. The purpose of this study is to compile a treatise on mine-safety procedure which will enumerate the potential hazards in every phase of mine operation and will suggest methods for their correction and for eliminating accidents. F. G. Smith, Sunday Creek Coal Co., chairman of the committee on roof action, explained the procedure that this group will follow in conducting its study. This committee has just been organized; its purpose is to prepare a report which will deal with roof action from a practical rather than a theoretical viewpoint.

Corley Strike Short-Lived

A strike which lasted three days at No. 6 mine of the Corley Co., Florence, Colo., was settled on Nov. 29, when W. D. Corley, Jr., president of the company, signed a contract with the United Mine Workers following negotiations with Craddock Davies, U.M.W. representative. The agreement provides for a seven-hour day and five-day week. The mine's alignment with the U.M.W. completes the unionization of the Florence field.

Federal Mine Safety Conference Ends After Union Objects to Set-Up

WASHINGTON, D. C., Dec. 16—Arriving in the afternoon of the first day of a conference called by the Secretary of the Interior Harold L. Ickes, to meet here on Dec. 16–17, A. D. Lewis, United Mine Workers, promptly induced the colloquy to adjourn in favor of an open national conference in which mine workers and mine operators, Federal and State mining bureaus and departments would be invited to participate. He declared that the small conference called by the Secretary was not in accordance with the expressed wish of U.M.W. nor with the convention promised by President Roosevelt and that the meeting should provide for its own organization and develop its own agenda. His resolution, seconded by E. A. Holbrook, dean of engineering, University of Pittsburgh, passed without adverse vote.

Opening the session, Mr. Ickes said that the conference had been called to discuss the work of the Bureau of Mines, "that it is not an easy matter to prevent accidents under such conditions as are found in coal mines," but that "other hazardous industries—I have in mind the railroads—have made a remarkable reduction in accidents during the past quarter century. That commendable improvement has been made in reducing our coal-mine fatalities is shown by the fact that during the five-year period preceding the establishment of the Bureau of Mines there was an average annual death toll of 2,658, as compared with an annual average of 1,265 during the past five years. Major coal-mine explosions have decreased about 90 per cent during this same period. . . .

"During 1935, more than 57 per cent of the bituminous coal mines in the United States had no fatal accidents. In other words, the 968 fatalities in bituminous coal mines occurred in 43 per cent of the operating mines. This raises the question why, if 57 per cent of the mines can operate without fatal accidents, cannot all mines do likewise? Is it because of local conditions; is it due to poor methods of mining; is it the fault of management; is the worker to blame; is it due to lack of cooperation between Federal and State governments or men and management; or is some legislative action necessary? I do not know the answer. . . .

"With the limited personnel of 55 field men to serve the entire mineral industry and an appropriation for safety work of an amount less than that spent by one coal-mining State, it is apparent that the field of mine-safety activities cannot be fully covered by the Bureau of Mines." Harry Slattery, personal assistant to the Secretary, then took the chair.

Recently, an inquiry had been made of him as solicitor of the department as to the right of the Bureau of Mines officials to enter a mine for inspection and report, announced N. R. Margold. He had been disposed to render a decision favoring such right, but the act of Feb. 25, 1913, gave him no opportunity to do so. He had even referred the matter to the Attorney General. A draft of a law had been written and submitted to Senator Guffey for presentation in the Senate, but he understood J. L. Lewis had advised him to drop it. "I am your attorney," he continued, addressing the conference, "to draft a law expressing your opinion."

Bureau Entry Rarely Denied

Rarely, said J. W. Finch, director, Bureau of Mines, have officials of the Bureau been denied access to mines they sought to visit. The 43 per cent of mines mentioned by the Secretary must be forced to take action to better their accident record. In the interest of safety, he mentioned among many other details, that the Bureau had established 472 chapters of the Joseph A. Holmes Safety Association and made 1,600 explosion tests at the Experimental Mine. To make the needed progress many more men and adequate funds were required by the Bureau. In accordance with the law, only composite reports of mine disasters are made. If, however, a change should be made in the law so that reports on individual disasters were made mandatory, he would be satisfied.

The real problem is not first aid to the injured but safety, asserted P. T. Fagan, president, District 5, U.M.W. Quoting some recent figures, he declared that first aid has not caused a reduction in accidents per million man-hours worked. Mechanization has introduced greater hazards, for in the din the cracking of the roof cannot be heard. To be a miner today with the present health examinations a man has to be an "all American" and yet even then he faces death and injury. What was needed was a larger conference in which anyone who wished could be represented.

"I cannot agree that what is wanted is a national conference," urged Eugene McAuliffe, president, Union Pacific Coal Co.,

Coming Meetings

- Twelfth Annual Mining Institute: Jan. 16-21, College of Mines, University of Washington, Seattle, Wash.
- American Society of Heating and Ventilating Engineers: annual meeting and symposium on solid-fuels utilization, Jan. 23-27, 1939, William Penn Hotel, Pittsburgh, Pa.
- American Mining Congress: 41st annual meeting, week of Jan. 23, Washington, D. C.
- American Institute of Mining and Metallurgical Engineers: annual meeting, Feb. 13-16, 1939, 29 West 39th St., New York City.
- American Mining Congress: sixteenth annual coal-mining convention and exposition, April 24-28, Music Hall, Cincinnati, Ohio.
- Second Annual Anthracite Conference: April 28 and 29, Lehigh University, Bethlehem, Pa.

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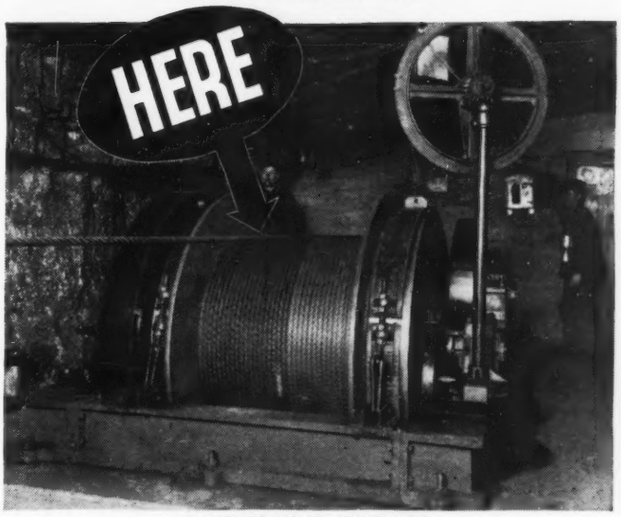


UNDERGROUND HAULAGE

"but rather a small body to suggest action for submission possibly to State conferences." His experience showed that mechanization need not be more hazardous than hand mining. The unions might well do more for safety than they were doing. The U.M.W. *Journal* never referred to it, yet safety rested 75 per cent with the mine worker and only 25 per cent with the employer. The locals were not safety minded and had protested against undercutting machines, permissible explosives and safety clothing.

Loose organization should be charged with the accidents due to mechanization, suggested W. D. Hotchkiss, Carnegie Institute of Technology. He did not know but suspected that studies being made would show that the mines in Illinois and Indiana which advanced only to the 30-per-cent stage of complete mechanization had caused the record of mechanical loading to have a sour look. Such feeble mechanization efforts probably were indifferently organized.

Bureau of Mines officials or those of any central authority should not be given the right to go underground or make inspections in place of the State inspector, asserted Dean Holbrook. To improve this duty would destroy the police powers of the State.

Much may have been said as to eliminating politics from inspection and to its occurrence in State inspection. The evil needs correction, but, commented James McSherry, director, Department of Mines and Minerals, State of Illinois, the right of appointment cannot well be taken from the Governor.

What was wanted, suggested H. N. Eavenson, consulting engineer, was a movement rather than legislation. A national meeting would not be effective. The 43 per cent of operators would not attend. Nor did he desire safety to be turned over to a coal commission, with which last opinion Mr. Fagan agreed.

"Safety Last" in Budget

Appropriations should be increased to five times present values, said J. B. Hedges, assistant to director, Bureau of Mines. Of $2,500,000 in this year's budget only $635,000 is earmarked for mine accidents and safety. He did not favor clothing the Bureau with inspectional duties. But, complained W. N. Polakov, U.M.W., coal mining is interstate, not intrastate, and should be thus regulated, and why, if it was not authorized by law, did the Bureau of Mines state the facts as to the Keen Mountain disaster? Of $53,000,000 voted for the Bureau in 25 years only 15½ per cent had been allotted to safety, declared J. B. Andrews, secretary, American Association for Labor Legislation.

Many operators are conscientious but some don't appear to care, lamented Daniel Harrington, U. S. Bureau of Mines. Of the 55 safety officials, half are engineers and half men without college training. These have to cover all kinds of mines—metal, non-metal and petroleum operations. They travel 750,000 to 1,000,000 miles annually in automobiles. If the Bureau continues as it is but with more men, in five years, a 50 to 75 per cent reduction in accidents can be expected.

Reading the correspondence between the President and John L. Lewis, his brother, A. D. Lewis, declared the conference called did not represent what had been promised. Only three mine workers and three operating men had been summoned out of twenty persons. It was not a representative meeting.

Discussion as to time arose. Dr. Andrews wanted speedy action, preferably at the meeting, arguing that timing was as important as legislation. The governors were about to address the legislatures urging the passage of suitable enactments; hence it was important that the meeting make a pronouncement. Mr. Lewis wanted the meeting when the mine workers had more time to attend; Mr. McAuliffe would postpone it until after Christmas; L. J. Putman, general superintendent, Raleigh-Wyoming Mining Co., until after New Year's, but in the end no date was set, and the motion of Mr. Lewis simply called for a conference in line with the resolution of the U.M.W.

The conferees were as follows: *Engineering Profession*—Mr. Eavenson, Dr. Holbrook, C. E. Stuart, consulting mining engineer (absent); *Operators*—Dr. McAuliffe, Mr. Putman, T. J. Thomas, president, Valier Coal Co. (absent, sick); *Public*—Mr. Andrews, A. W. Dickinson, American Mining Congress; Dr. Hotchkiss; *Labor*—Mr. Fagan, Mr. Lewis, Dr. Polakov; *Interior Department*—Dr. Finch, Mr. Harrington, Mr. Hedges, F. L. Kirgis, first assistant to solicitor; Mr. Margold; *State Officials*—W. B. Hillhouse, chief mine inspector, Department of Mines, Alabama; Mr. McSherry and N. P. Rhinehart, chief, Department of Mines, West Virginia.

Keeping Step With Coal Demand

Bituminous Production

	1938 (1,000 Tons)	1937* (1,000 Tons)
November 5	7,982	8,880
November 12	8,050	8,957
November 19	8,325	8,165
November 26	7,665	7,452
December 3	8,500	8,267
Total to December 3	309,066	409,173
Month of November	**35,480**	**36,428**

Anthracite Production

November 5	870	1,060
November 12	806	1,002
November 19	834	1,029
November 26	645	957
December 3	1,188	849
Total to December 3	41,120	47,342
Month of November	**3,737**	**4,439**

* Outputs of these two columns are for the weeks corresponding to those in 1938, though these weeks do not necessarily end on the same dates.

Bituminous Coal Stocks

	(Thousands of Net Tons) Nov. 1 1938	Oct. 1 1938	Nov. 1 1937
Electric power utilities	8,173	8,029	8,944
Byproduct coke ovens	6,459	5,952	8,067
Steel and rolling mills	620	638	1,290
Railroads (Class 1)	5,061	4,672	6,747
Other industrials*	10,997	10,086	14,581
Total	31,310	29,377	39,629

Bituminous Coal Consumption

	(Thousands of Net Tons) Oct. 1938	Sept. 1938	Oct. 1937
Electric power utilities	3,584	3,338	3,908
Byproduct coke ovens	4,360	3,770	5,723
Steel and rolling mills	736	652	928
Railroads (Class 1)	6,652	5,938	7,649
Other industrials*	8,400	7,418	14,856
Total	23,732	21,116	29,384

* Includes coal-gas retorts and cement mills.

Natural Gas Plan Deferred In St. Louis Area

Southern Illinois merchants and industries were asked by the Illinois Reciprocal Trade Association, in a communication dated Dec. 2, to bring to the attention of St. Louis (Mo.) jobbers and manufacturers the injurious effects on southern Illinois and the loss of business to St. Louis if the proposal to change to straight natural gas in the Mound City is carried out. J. W. Spresser, president of the trade association, said in his letter: "From 40 to 90 per cent of the goods on the shelves of southern Illinois merchants come from St. Louis jobbers and manufacturers. These merchants' customers are coal miners and railroad men and their families and other persons who are dependent upon the coal industry. Without coal-mine payrolls these merchants can't continue to sell and certainly they can't continue to buy stocks out of St. Louis."

Richard F. Wood, executive secretary of the Coal Exchange of St. Louis, said: "Natural gas is not only a detriment to the progress of St. Louis but a serious impediment to the future welfare of the city. Substitution will increase unemployment. It will decrease trade and commerce. Substitution will result in reckless misuse of natural resources. This is not a contribution to progress."

The Laclede Gas Light Co. informed the Missouri Public Service Commission on Dec. 5, however, that it was not ready to provide straight natural gas for general use in St. Louis. Guy A. Thompson, counsel for the company, said that, according to expert opinion obtained by the company, it would be wrecked financially, under existing conditions, if it substituted natural gas for the present mixture of natural and artificial gas.

Obituary Notes

SAMUEL A. SCOTT, 67, president of the New River Co., Mount Hope, W. Va., died Nov. 27 of a heart ailment at Lenox Hill Hospital, New York City. His career in the coal industry began in Pittsburgh, Pa., but he had been active a great many years in the New River smokeless field, serving as general manager of mines for the Monongahela River Consolidated Coal & Coke Co. before joining the New River Co. as general manager in 1911.

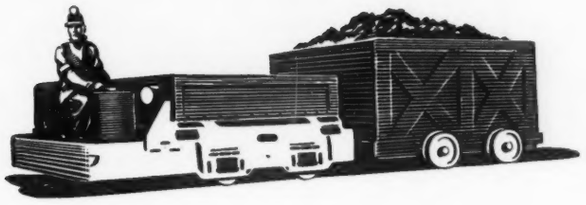
LOUIS D. ABBOTT, 60, division engineer West Virginia division, Consolidation Coal Co., died Dec. 1 at Fairmont, W. Va., following an operation. A graduate of Lehigh University, he laid out the town of Jenkins, Ky., for his company and resided there twenty years before moving to Fairmont seven years ago.

JOHN W. BASTIN, 76, general manager and purchasing agent of the Nelson Creek Coal Co., Nelson, Ky., died Nov. 27.

JOHN C. BURTON, 61, tipple foreman for the Crozer Coal & Coke Co., Elkhorn, W. Va., for the last 38 years, died Dec. 5 at the Bluefield (W. Va.) Sanitarium following a kidney operation.

WALTER NESBIT, 63, former Congressman-at-Large from Illinois and at one

(*Turn to page* 64)



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time secretary-treasurer of the Illinois district of the United Mine Workers, died suddenly Dec. 6 at his home in Belleville, Ill. He had been ill for two years.

D. S. KEISTER, 88, president of the Lincoln Coal & Coke Co., Scottdale, Pa., died during the last week of November.

WILLIAM H. WOODHEAD, 61, master mechanic for the Independent Coal & Coke Co., Kenilworth, Utah, died in his sleep Dec. 1. Born in England, he went to Utah as a mechanic for the Utah Fuel Co. at its Sunnyside mine, subsequently becoming master mechanic at the latter company's Clear Creek mine.

ERNEST LEONARD WARBURTON, well known as a mining engineer in British Columbia, Canada, died Dec. 5 at his home in Nelson, B. C., after a week's illness. He was general superintendent of the old Corbin Collieries, Ltd., Corbin, B. C., for 17 years.

EDWARD B. DAY, for many years secretary of the West Virginia Coal Mining Institute, died Aug. 31 from a heart attack at Bradenton, Fla. He had formerly been connected with the Keystone Publishing Co. and at one time was president of the Hydrotator Co.

DR. CHARLES EDWARD MUNROE, 89, renowned chemist and one of the best known explosive authorities in the world, died Dec. 7 in his home at Forest Glen, Md. Among his outstanding achievements was the development of permissible explosives, the use of which has been the means of reducing disasters arising from explosions of gas and coal dust in coal mines. For many years after the widespread mine explosions of 1907 he rendered service in the development of safer explosives for use in coal mines, first as consulting explosives expert for the Technological Branch of the Geological Survey and later for the Bureau of Mines from its organization in 1910. He was chief explosives chemist from 1920 to 1933.

Hard-Coal Conference Plans

Members of the committee on arrangements for the Second Annual Anthracite Conference, to be held at Lehigh University, Bethlehem, Pa., met Nov. 23 at the Anthracite Industries Laboratory, Primos, Pa., to consider plans. Prof. Howard Eckfeldt, chairman, announced that the conference would be held on April 28 and 29. The first conference, held last spring, aroused so much interest in engineering and merchandising circles that it was decided to make the meeting an annual affair. The chairman said that invitations had been sent to a group of prominent authorities to present papers at this year's conference, and he expected 100 per cent acceptance.

The committee on arrangements also includes Allen F. Johnson (vice-chairman), F. W. Earnest, Jr.; J. P. Duffy, J. M. Crosby, J. H. Goundie, and Paul C. Mulcey, of Anthracite Industries, Inc.; W. H. Lesser, electrical-mechanical engineer, Pierce Management; J. R. Ray, C. E. Mengel; Dr. H. J. Rose, Mellon Institute of Industrial Research; and Dean Bradley Stoughton and Profs. Eric Sinkinson, D. H. Gramley and F. V. Larkin, Lehigh University.

Casualties and Acidification of Streams Coal Mining Institute's Leitmotifs

TRUE to its historic background, the Coal Mining Institute of America, meeting at Pittsburgh, Pa., Dec. 8 and 9, placed its major emphasis on safety, with ventilation as a side note. In view of the seriou ness of the water acidification problems of its members, one address was devoted to that subject, and at the banquet the time-honored question of the future of the coal industry actually had some new light thrown on it by the speaker of the evening. The president, C. W. Pollock, general superintendent, Ford Collieries Co., occupied the chair at all meetings.

Acidification of Mine Water—Reagents for neutralization of acids in mine water, said R. D. Leitch, associate chemical engineer, U. S. Bureau of Mines, are crushed or preferably finely ground limestone, marl or other alkaline earths and calcined or hydrated lime. Although the per-ton cost of the last named is greatest, its greater neutralizing power, the lesser bulk of its sludges and other advantages make its use possible. Alkaline wastes also may be utilized, such as sulphite liquors from pulp or paper mills, domestic sewage, blast-furnace and steel-mill sludges and even drainage waters from some mines and quarries, not excluding even some coal mines. In foreign countries, alkaline wastes for mixing with acid mine waters are often readily available and the congested conditions prevailing often require methods of control such as thus far have not been needed in this country.

Neutralization Cost — In the Indian Creek Valley of Pennsylvania, a neutralizing plant, now no longer in existence, used hydrated lime containing 90 per cent of calcium hydroxide and costing $12 per ton at the mine. The workings from which the waters came produced about 1,000 tons of coal per day and delivered daily an average of 500,000 gal. of water.

Thus, about 6 tons of water had to be neutralized for every ton of coal mined, a ratio that J. J. Walsh, then Secretary, Pennsylvania Department of Mines, regarded as normal for the bituminous mines of that State. For complete neutralization, 7.6 lb. of hydrated lime was used per 1,000 gal., or 3,800 lb. per day. Costs of operation are given in Table I. Thus, the water was neutralized for 6c. per ton of coal, or 11.6c. per 1,000 gal. of water. If the precipitated iron oxide is to be recovered in a form suitable for storage or possible sale—and for permanent operation, one or the other would be necessary—estimated cost would be about 9c. per ton of coal, or 17.6c. per 1,000 gal. of water. Cost of chemical neutralization must be calculated for each mine, and must be regarded as an operating burden from which virtually no profit can be returned to the operator.

Formation of Sulphuric Acid — Even without access to air, or to the oxygen it contains, the ferric sulphate derived from pyrite is converted into sulphuric acid and hydrated oxides of iron, which latter will settle out of water, if given opportunity.

Table I—What It Cost to Neutralize Mine Water at Indian Creek, Pa.*

3,800 lb. hydrated lime at 0.006 c. per lb.	$22.80
Labor, 3 man shifts at $4	12.00
Power (rate not given)	4.50
Chemical supervision	2.00
Interest and depreciation (15 per cent of $40,000)†	16.50
Total cost per day	57.80

* J. O. Handy.
† Housing, equipment and construction of plant.

They are not in themselves acid, but the sulphuric acid, which remains in the water, is and, being colorless, its presence often is not suspected, so that under some conditions the solution may be clear, though nevertheless very corrosive to some metals.

Sealing Preferable—Air may be kept from the pyrite in the mine either by sealing or by impounding water. Sealing is simply excluding air from mines or parts of mines by masonry or other stoppings, leaving opportunity for natural drainage and incorporating a gooseneck or other water seal that, preferably, will not raise existing water levels.

With this method, the gob is not flooded and hence its acid salts do not enter the water; dangerous hydrostatic heads are not created and construction cost is kept at a minimum, as these stoppings have to withstand little or no pressure, yet oxidation of pyrite ceases and, hence, no more acid is formed. Thus, as soon as the acid and acid salts already existing in the standing waters or in the waterways of the mine have been either neutralized or flushed away by alkaline or normal underground waters, water issuing from the mine will be of like quality to that which left the strata before the mine was opened.

Impounding Undesirable—By impoundment, Mr. Leitch declared, he meant complete or virtually complete flooding of underground areas with attendant exclusion of oxygen or air. This also will pre-

Sales of Mechanical Stokers Register Decline

Sales of mechanical stokers in the United States during October last totaled 17,681 units, according to statistics furnished the U. S. Bureau of the Census by 112 manufacturers (Class 1, 71; Class 2, 49; Class 3, 43; Class 4, 38; Class 5, 15). This compares with sales of 20,452 units in the preceding month and 16,956 in October, 1937. Sales by classes in October last were: residential (under 61 lb. of coal per hour), 15,728 (bituminous, 13,488; anthracite, 2,280); small apartment-house and small commercial heating jobs (61 to 100 lb. per hour), 890; apartment-house and general small commercial heating jobs (101 to 300 lb. per hour), 721; large commercial and small high-pressure steam plants (301 to 1,200 lb. per hour), 274; high-pressure industrial steam plants (more than 1,200 lb. per hour), 68.

Forward Steps to Greater Safety in Electric Blasting Caps

Atlas Manasite. For greater safety, Atlas Manasite gives full detonating efficiency with reduced sensitivity to impact and friction. This lessens chance of accident through inadvertent mishandling.

Atlas Insulated "Match-Head." For greater safety, the Atlas Match-Head Electric Blasting Cap provides accurate, reliable firing and positive insulation of the firing device from the copper shell.

Atlas Safety Shunt. For greater safety, Atlas Metal Safety Shunts protect against accidental firing by short-circuiting the leg wires.

Atlas Accordion Fold. For greater safety, this convenient tube encloses many folds of wire to protect the detonator.

When you review the history of electric blasting cap progress, you can't escape the conviction that Atlas improvements have been high spots in leading the advance toward greater safety and more effective detonating methods. "Atlas Firsts"—the Match-Head, the Safety Shunt, the Accordion Fold, and Atlas Manasite—each has given greater effectiveness to safety precautions. Each has contributed to efficient and economical blasting. Ask your Atlas representative.

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ATLAS

EXPLOSIVES

CHEMICALS ATLAS EXPLOSIVES

vent the further formation of acid, but is like using "a sledge hammer to drive a tack." It establishes hydrostatic heads that are hazardous to adjacent operations and may flood surface works, for water may escape at new places and elevations. It may pollute water supplies hitherto guarded and will inevitably cause the water to soak up all acid and acid salts already formed in the area thus covered.

Entrant Waters Always Alkaline—All waters that enter the mine are alkaline, for pyrite cannot be oxidized by water from the surface because what little oxygen it contains is absorbed largely by humus acids near the surface. Any oxygen remaining either oxidizes pyrite or remains unchanged, and the little acidity from the pyrite is readily neutralized by alkalies in the ground. Only at Clymer, Pa., had he found entering water acid, and there it came from an already acid stream above. Impounding cannot neutralize or alkalinize mine water except by addition of neutral or alkaline water or by action of alkaline material derived from environing floor or walls. Water from the Big, or Pittsburgh, bed in the Georges Creek region leaves the mine so pure that watercress grows in it, interjected J. J. Rutledge, chief mining engineer, State of Maryland.

All Sulphate Becomes Free Acid—In answer to W. R. Chedsey, director, School of Mines and Metallurgy, University of Missouri, Rolla, Mr. Leitch said about a third of the ferric sulphate will hydrolyze into sulphuric acid and basic hydrate. However, as neutralization by alkaline waters and wastes, sewage, etc., occurs, more ferric sulphate will hydrolyze until all of it is spent.

Asked what oxygen percentage in the mine atmosphere was necessary for the oxidation of pyrite, Mr. Leitch said he did not know. Oxygen percentage tends to become zero in sealed areas. In the State of Indiana, he had found the percentage almost always below one. With percentages below ten, oxidation is practically prevented. Suppose the maximum barometric change possible adds 5 per cent of air to the atmosphere in a sealed area; it will introduce only a fifth of that quantity of oxygen, or one per cent.

Keeping Death From the Rail

Cures for Transportation Accidents—Compared with all other coal-mine accidents, those in transportation take second place in frequency and severity rates, asserted R. J. Craig, private inspector, Rochester & Pittsburgh Coal Co. Increases in these accidents have not been due to introduction of new machines and new methods, as statistics show that the greater percentage of accidents arise from hazards with which the industry has been acquainted for at least ten years. Over 50 per cent of all coal-mine casualties should be classified as haulage accidents. If coal companies do not take precautions against such accidents, laws regulating speeds and requiring systematic inspection may be expected, as already enacted for automobile transportation.

Conveyors, Physical Tests and Dispatching Helpful—A marked reduction in haulage accidents should follow the introduction of conveyor mining, as hazards are materially decreased when cars no longer are moved into and out of rooms by gathering locomotives. Elimination of car pushers and hoists in gathering service

J. V. McKenna

would substantially reduce the number of transportation accidents.

Why Electrical Accidents Occur—To repairs improperly made and inadequate substitutes, brought about by an urgent desire to prevent a cessation of production or to earn as much money as is physically possible, J. F. Conrad, electrical inspector, Pennsylvania Department of Mines, ascribed the large number of electrical accidents. Men should know not only how to install and operate equipment but should know its construction details.

Training Courses for All Machine Operatives—This would entail training courses for cutting-machine runners, loading-machine operatives, motormen, pumpmen, wiremen and underground mechanics similar to those given to first-aid or mine-rescue men, except that courses would cover an elementary training in electricity and the use and care of mining equipment supplemented with practical demonstrations of methods of making repairs and replacements.

More Trolley Poles Needed—Mining machines used extensively in tramming should be provided with trolley poles, so that "nipping," or holding of the positive conductor of the trailing cable against the trolley wire while tramming from place to place, will be unnecessary. Nipping is inefficient, detrimental to the eyesight and a constant source of danger from ignition of gas, violent shock or electrocution.

Safe Way of Grounding at Face—A new method of attaching ground and return wires in haulage entries recently has been introduced in one of our leading mines, recalled Mr. Conrad. Old rails are laid at right angles to the main track, and inverted under and welded to both track rails. These old rails are laid flush with the level of the bottom and extend to one side of the track to a point close to the rib line, at which point they are curved upward. The wires in turn are carried overhead from the equipment on insulators to a post placed near the curved end of the rail to which they are connected. Thus the wires are kept clear of the bottom and they cannot be kicked loose or torn out by derailed cars.

Pellet Powder Dangerous—Opening the discussion on pellet powder, the temporary chairman, Dr. Rutledge, declared that about 1927, a pellet powder with sodium nitrate, sulphur and charcoal was introduced into southern Illinois. It pulled the coal to the back of the cut and left a straight clean face and straight rib.

Though safer to handle and more convenient to use, it has nearly the same hazards as black powder, declared Dr. Rutledge. It is packed in boxes; so there is less hazard than if it, like blasting powder, were contained in steel kegs and readily ignited by electrical contact. Opening of a box of pellet powder is less dangerous than opening a steel keg with a pick, for, with pick and steel keg, a spark may set off the powder.

Being unglazed, it is in some respects less safe than black blasting powder. Moreover, when the sticks are broken, these portions readily may be ignited by a chance spark or flame. If, due to dullness of an auger, the hole in which the stick is placed is crooked or of insufficient diameter, the sticks will be abraded, and fine particles of the pellet may fall to the lower portion of the drillhole, and if the miner pushes in the stick or sticks with a steel or iron tamping bar, a blast may occur prematurely. Of course, tampers and needles should be of copper and not of steel or iron.

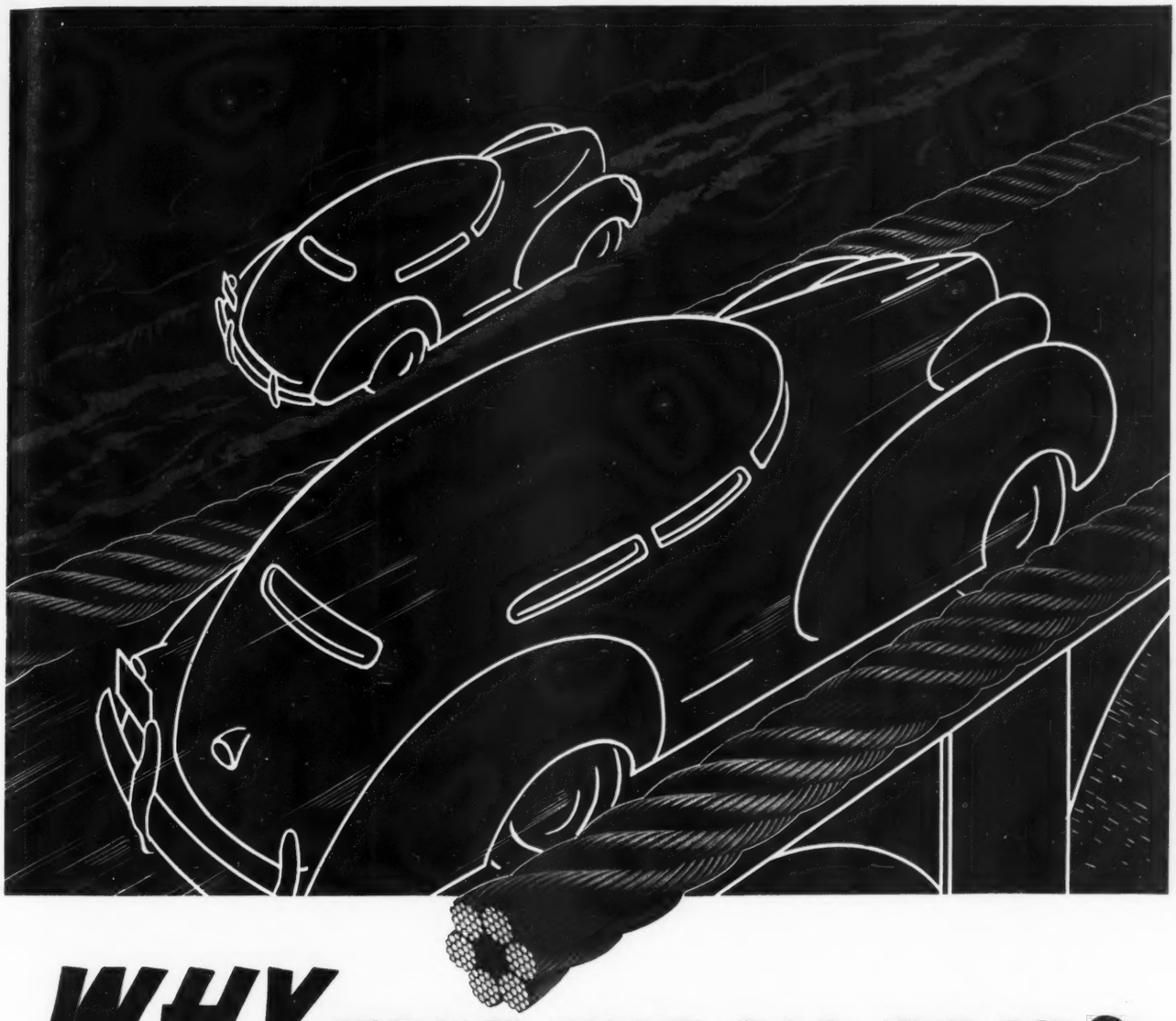
Not being coated with paraffin, pellet powder absorbs moisture but is not readily ignited by friction, declared J. E. Tiffany, explosives engineer, U. S. Bureau of Mines. It makes as much poisonous gas as permissible powder and may make more. Pellet powder, asserted Daniel Harrington, chief, Health and Safety Branch, U. S. Bureau of Mines, is difficult to use effectively in wet places, makes much carbon monoxide, hydrogen sulphide and perhaps other gases and is not in any way to be regarded as a safe explosive.

Yet Pellets Have Virtues

Advantages of Pellet Powder—When pellet powder is carried in non-conductive wood boxes, rubberized canvas bags or Bakelite containers, there is little chance of ignition, countered R. E. George, State inspector of mines, Tyrone, Pa. Not being loose, pellet powder cannot be spilled like black blasting powder. It is less likely to be ignited in the individual working place and, being in cartridge form, the dangers involved in miners making their own cartridges are avoided. Charges can be better gaged with pellet powder and therefore blasting practice can be standardized.

Loose powder when used in steep pitch work may run out at the needle hole while the needle is being withdrawn, and several accidents have thus occurred. However, sometimes one or more sticks in a hole will fail to ignite, also the pellet powder may twist the needle so that, in being withdrawn, it will disturb the tamping, and the speed of the combustion of the explosive, being increased by its compression into cartridges, the spreading effect of the blast is reduced and more dust is made in the immediate location of the explosive.

"My accident experience in the use of pellet powder over the past ten years," concluded Mr. George, "has been very favorable." One mine in particular has used about 250,000 lb. without directly causing an accident. Accidents from the use of pellet powder can be prevented if the company will exercise discipline and



WHY TAKE THE OLD ROAD?

LAY-SET Preformed is as much improved, for many applications (over the wire ropes of 1926), as the smooth stretch of concrete is better than the mud-ruts of yesteryear. With LAY-SET Preformed available, the use of non-preformed wire rope on your machine is like purposely choosing a bumpy, slow-moving detour when driving. LAY-SET Preformed wire rope assures your machine smooth, less-interrupted going. It works faster, easier, safer, *longer.* It resists kinking and whipping. It is the highway to greater-dollar-value. LAY-SET Preformed both fills the bill and cuts it down. *All* Hazard wire ropes made of Improved Plow Steel are identified by the Green Strand.

BUY ACCO QUALITY *whether for Hazard Wire Ropes —American Chains (Weed Tire Chains—Welded or Weldless Chain)—Campbell Abrasive Cutting Machines—Page Chain Link Fence—Page Welding Wire—Reading-Pratt & Cady Valves—Wright Hoists or any other of the 137 ACCO Industrial Products.*

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exclude safety fuse, asserted F. T. Powers, district mine inspector, Maryland Bureau of Mines.

Safety Increased by Suitable Equipment—Semi-automatic couplers, declared W. P. Vance, general superintendent, Butler Consolidated Coal Co., "have enabled us to operate for nine years without hand or other injuries chargeable to coupling or uncoupling cars." Elimination of brakes has prevented those finger, hand and other injuries chargeable to bent levers and to a misplaced confidence in brakes, which operate poorly if at all.

Capitalized Value of Human Effort—"Figured on a conservative basis," he added, "the present wages being paid would indicate an investment of $25,000 per employee, or a total of $12,500,000, at an average mine employing 500 men. Who would buy a $25,000 machine as casually as we ordinarily choose our employees or operate and direct a $12,500,000 machine with as little thought and attention as many companies afford their man power?

"While we may be eager to take a chance on an auto, a gun, a baseball pool, or even the numbers, what man, if he thinks beforehand, would gamble away his own limbs, eyes or hearing? Who in a poker game would stake his own foot against that of his opponent? And yet, because we have failed to impress upon our employees their own responsibility for their welfare, we find them wagering a limb, an eye or a back against some short cut in their own work," asserted Mr. Vance.

In a discussion of an address by P. J. Callahan, State mine inspector, George Steinheiser declared that unless a superintendent "cleaned house" on his haulage roads, he could not expect his miners to do any better in their several room faces.

Where Coal Dust Lurks

Back-Heading Rock-Dusting Essential—In several recent explosions where back headings were not rock-dusted, asserted J. V. McKenna, State mine inspector, all stoppings were blown into rock-dusted main headings, showing that the explosion had followed the heading that had not been rock-dusted. Moreover, explosions were confined strictly within a section wherever back headings had that protection. Back headings, therefore, should be coated with rock dust.

Baffles Remove Coal Dust—One concern put strips of brattice cloth across the roadway far enough to leave an opening only 4 to 6 ft. wide. These strips were placed first on one side of the heading and then on the other for a distance of 30 or 40 ft. The air thus traveled first on one side and then on the other and, impinging on the brattice cloth, dropped its dust. This prevented much dust from entering back headings.

When, Where and How to Dust Back Headings—To all entries, aircourses, rooms and crosscuts, ½ lb. of rock dust should be applied per foot of perimeter for each foot of aircourse length, about 10 to 15 lb. per lineal foot of aircourse if cross-sectional area is or exceeds 60 sq. ft., declared C. H. Dodge, safety engineer, Buckeye Coal Co. Such aircourses should be rock-dusted at intervals of one to ten years, dependent on the rapidity with which coal dust is liberated from the face.

As present rock-dusting reinforced rubber hose of 4-in. diameter will carry rock dust not more than 1,000 ft., wherever there are four aircourses parallel to, and on one side of, the haulageway with crosscuts on 100-ft. centers and the furthest aircourse 400 ft. from this haulage road, openings for passing the hose should be at not over 1,000-ft. intervals. Approaches will have to be at shorter intervals if the smaller size pipe is used. Dependence on penetrable stoppings, if placed more than 1,000 ft. apart, will cause serious delays in changing hose and in traveling between hose outlets and machine, such delays even under favorable conditions averaging two hours in each shift. However, as an hour of each shift will be consumed in setting up the machine at its temporary loading station, the intervals should not be much shorter.

Rock-Dusting Prevents Mine Fires—Fires from falls of trolley wires have been found to be less dangerous where rock-dusting has been done, asserted Mr. McKenna. They used to be frequent, but he had had none for eight years. Frank Dunbar, general manager, Pickands, Mather & Co., said that a fall of trolley wire failed to make a dangerous fire after an hour's exposure.

Rock-Dusting in Thin Coal — At the 4,000-ton-per-day Kramer mine of the Northwest Mining & Exchange Co., stated C. H. Maize's paper (read by another), the coal seam has an average thickness of 36 in. and there are about 42 miles of back heading. One M.S.A. high-pressure machine with 500 ft. of hose is used for dusting back headings and an American Mine Door machine for haulage roads.

Hose is taken through the last open crosscut to dust the back heading as far as it will reach. Slide doors are inserted every 400 ft., as the rock-dusting machine at the present time is not efficient with more than 200 ft. of hose. A good dusting lasts through the 18-month life of a room heading.

Blowing Dust Into Trackless Headings—Trackless passages have been rock-dusted in an English mine by a device that disperses rock dust before it is liberated in the air current, recalled H. P. Greenwald, supervising engineer, experimental coal mine section, U. S. Bureau of Mines. A steel tank holding 50 to 75 lb. of rock dust is placed on the floor at the intake end of an untracked passage, and compressed air introduced by a ½-in. pipe into the bottom of the tank; a pipe at the top discharges the dust thus dispersed in the direction of air travel.

Air flows into the tank so slowly that almost 24 hours is needed to exhaust the dust. All surfaces in the passageway, which was over 500 ft. long, in the instance which Mr. Greenwald noted, were piled to the angle of repose with rock dust from the tank. A compressed-air injector, weighing only 5 lb. and known as the Lamb air mover, devised for ventilation purposes, is used in the State of Washington to eject a dense cloud of dust from the nozzle into the faces of steep pitches.

A Revolution in Fans—Propeller-type fans are far from new, admitted A. L. Barrett, but the aerodynamically designed fan of that type has rehabilitated the fan industry by increasing efficiency and raising air pressures above 2 in. of water gage. From 90 to 95 per cent of the new fans installed in the past eighteen months have been of axial-flow or propeller type, increasing ventilating efficiency 15 per cent, which, under favorable conditions, reaches 90 per cent when based on total pressure at intake of an exhaust fan.

Flexible to Mine Demands

Ventilating efficiency curves for these fans are much flatter than with the centrifugal unit. With equivalent orifices ranging from 17 to 47 sq. ft., efficiencies exceeding 80 per cent have been obtained, enabling fans to operate over wide range of duties. Thus one company has been able to standardize on an 8-ft. fan.

Variable-pitch propellers provide for a still wider range of service. With this kind of fan and a driving motor with four available speeds, almost continuous variation in volume at satisfactory efficiency can be obtained from a maximum volume to an air current about 20 per cent as large. Even a two-speed motor will widen the range of the fan. This flexibility makes it possible to reduce volume with economy when a mine is shut down. Though a large reduction in propeller pitch much reduces efficiency, power required is so small that it will not be profitable to reduce the speed of the fan at the normal propeller pitch by means of a new drive.

Advantage of Axial-Flow Fans—Propeller fans being high-speed units, usually from 400 to 900 r.p.m., short-center flat-belt drives and high-speed pivoted-base motors can be used. Flexibility in speed is facilitated by the flat belt, as cost of changing pulleys is at a minimum. Space for motor and drive is reduced with these fans, which are also readily reversible. This, with most 3-phase motors, involves reversing only two power leads. No rusty doors have to be opened. Installation cost is half that of the centrifugal fan, though the cost of the fan is about the same. High portability is another advantage, saving time and money. An 8-ft. propeller fan of the H. C. Frick Coke Co., producing 119,000 c.f.m. at about 2½ in. of water gage and using 49½ kw., has replaced another fan which, for that volume and pressure, required 116 kw.

Noisy Because of High Speed—Propel-

Institute Officers for 1939

President—J. V. McKenna, State mine inspector, Waynesburg, Pa.

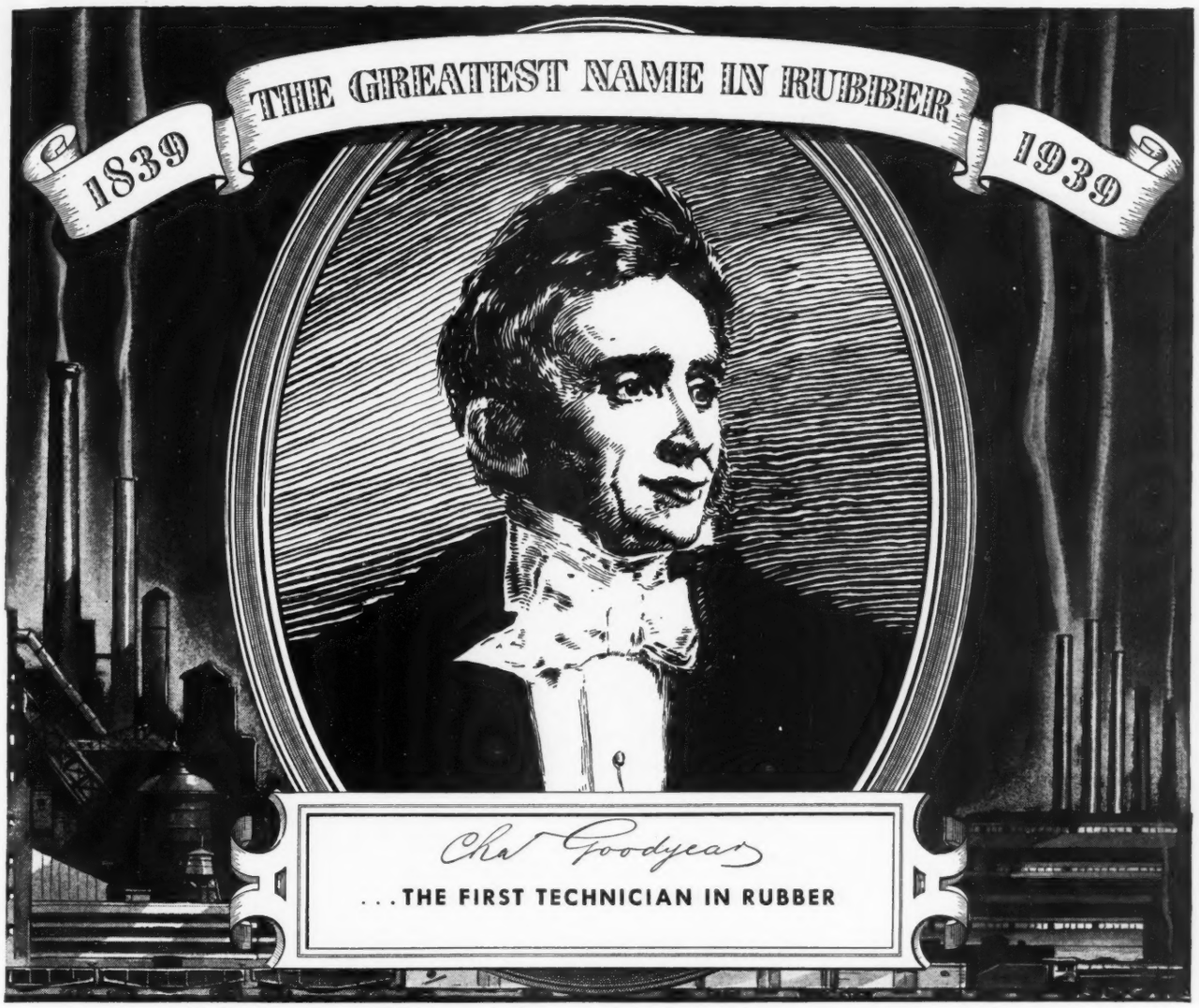
First Vice-President—N. G. Alford, consulting engineer, Eavenson, Alford & Auchmuty, Pittsburgh, Pa.

Second Vice-President—F. A. Siemon, division general superintendent, Hillman Coal & Coke Co., Pittsburgh, Pa.

Third Vice-President—J. J. Forbes, supervising engineer, Safety Division, U. S. Bureau of Mines, Pittsburgh, Pa.

Secretary-Treasurer—G. W. Grove, U. S. Bureau of Mines, Pittsburgh, Pa.

Managing Directors—L. C. Campbell, assistant to vice-president, Koppers Coal Co., Pittsburgh, Pa.; M. L. Coulter, safety engineer, Clearfield Bituminous Coal Corporation, Indiana, Pa.; E. A. Holbrook, dean of engineering, University of Pittsburgh, Pittsburgh, Pa.; C. W. Pollock, general superintendent, Ford Collieries Co., Curtisville, Pa.; W. P. Vance, general superintendent, Butler Consolidated Coal Co., Wildwood, Pa.



"Notwithstanding all the difficulties he encountered, he went on. If there was reproach, he bore it. If poverty, he suffered under it. But he went on, and people then saw, when his invention was completed, that what they had been treating with ridicule, was sublime; that what they had made the subject of reproach, was the exercise of great inventive genius; that what they had laughed at, the perseverance of a man of talent with great perceptive faculties, with indomitable perseverance and intellect, had brought out as much to their astonishment, as if another sun had risen in the hemisphere above...

"I believe that the man who sits at this table, Charles Goodyear, is to go down to posterity in the history of the arts in this country, in that great class of inventors, at the head of which stands Robert Fulton... in which class stand the names of Whitney, and of Morris, and in which class will stand 'non post longo intervallo' the humble name of Charles Goodyear."

From the address of DANIEL WEBSTER *before the U. S. Circuit Court, District of New Jersey, in 1852.*

HE DISCOVERED *the process of vulcanization that gave us rubber as we know it today.*

He was first to conceive rubber's wide application in meeting industry's many problems.

He built the first practical rubber belting and demonstrated its efficiency over other kinds.

He fashioned from rubber the first successful hose for handling air, steam, oil, acids and other solvents.

He shaped the first enduring rubber molded goods; contrived from rubber the first dependable packing for steam engines.

In all he either manufactured, patented or envisioned more than one thousand different applications of rubber before his death 79 years ago.

His name was Charles Goodyear. He was the first technician in rubber.

◆ ◆ ◆

● This year marks the One Hundredth Anniversary of Charles Goodyear's discovery of vulcanization. In recognition not alone of his great contribution to the world but also of the self-sacrifice, the faith and courage of the man, this tribute is published by an enterprise founded long after his death — a business that, inspired by his example, seeks by serviceability to deserve his name. Dedicated to that service today is the G.T.M.—Goodyear Technical Man—who in countless new industries of which Charles Goodyear never dreamed carries on his work of multiplying rubber's usefulness through specialized application to industrial needs.

THE GOODYEAR TIRE & RUBBER COMPANY
AKRON, OHIO

ler fans are noisy because the air is rapidly accelerated over a narrow blade. Velocity reaches the realm of noise, and this cannot be corrected. The hood may be covered with "dumbbell" and then it will make as much noise as ever near the fan, but 60 ft. away the sound will be dissipated. A brick wall surrounding the discharge will throw the sound upward without decreasing efficiency.

When a direct-connected motor on a long shaft is used, air enters the fan with less interference, but then speed can be corrected only with a variable-speed motor, which is not very efficient. Of course, pitch or number of blades can be changed, but the fan operation is not so flexible as when a change in belt speed is provided. In from 30 minutes to an hour a change in pitch can be provided.

Timber Removed by Tugger Hoist—To remove posts in headings at the mines of the Hanna Coal Co., a tugger hoist with 300 ft. of ½-in. wire cable, operated by a 7½-hp. motor, is mounted on a hand-push truck. A snatch block is provided to facilitate operations and reduce rope wear, asserted C. C. Hagenbuch, production engineer. The timber-recovery crew consists of three men, others being engaged in recovering wire, track, ties, etc. Cross-timbering materials are 50- to 120-lb. steel rails or 6- and 8-in. steel I-beams.

Safety posts are set in the center of the heading on both sides of the cross timber, which is being recovered. Their use or non-use is left to the judgment of the recovery man. Rarely are any of these safety posts recovered. Where crossbar or legs cannot be drawn directly or by cutting away coal, one of the posts is notched with an ax at its half length to one-third to one-half its thickness by a man standing under the protection of the crossbarred roof. The rope is applied at the notch and pulled until the post breaks. Posts are not recovered to obtain pillar falls but to salvage material. In the first ten months of this year, $4.24 of crossbars and posts have been saved for every labor dollar expended, and the recovered material is located handily for reinstallation.

Recovery With Locomotive—Use of sledge hammer or ax is known to be unsafe, asserted B. J. Murphy, assistant safety director, H. C. Frick Coke Co.

Table II—Recoveries of Supports, H. C. Frick Coke Co., Based on Ten Rib Falls

Method	Percentage Recovered		
	Posts	Crossbars	Crib blocks
Using post puller	54.6	81.5	90.2
Using locomotive	57	77.3	88.3

When the roof has weighted over a crib, additional roof support should be provided at that point, and the crib block chopped out midway in the crib until a post puller can be used effectively.

When drawing supports with a mine locomotive and detachable wire rope, an empty unattached mine car is placed between locomotive and anchor post, and the rope is passed under the car so that if the former should break it will not fly back and injure the motorman.

Roof and supports should be examined before drawing the latter. When roof is bad or supports are damaged and under heavy stress, extra roof supports should be set in the center of the roadway to carry the extra load that near-by drawing will bring on the supports and to protect the men. The third step is setting of the breakrow crib and posts. Then in repeated steps (1) all good roof supports at the face are drawn back to the nearest crib, (2) crib nearest face is withdrawn and crib blocks recovered, always progressing outby. Poplar timber has been discarded by the Frick company because it will split in two. In one instance a life was lost in this way.

Rescue Work After Disasters—In leading the discussion on the progress of mine-rescue equipment and training, J. V. Berry, supervisor of safety, Industrial Collieries Corporation, said that the first use of self-contained oxygen breathing apparatus in an American mine occurred October, 1908, at a mine fire in No. 1 mine of the Washington Coal & Coke Co., Star Junction, Pa.

Time was, said Richard Maize, Deputy Secretary of Mines, Pennsylvania, when the intake had to be sealed first, because the return could not be reached. When the intake was sealed, air could be taken by a curtain up the return to the point where the return stopping was to be erected. He had never known of a serious accident thus resulting. About 1903, a seal on a fire in a mine near Monongahela City was opened without sampling or analyzing the air behind the seal, and the general superintendent and three mine officials were killed. No one would do that now. Mr. Maize recalled that in 1906 as superintendent of a mine, he put on a helmet, knocked a small hole in the bottom of the mine seal and crawled in alone, achieving nothing and having to be dragged out. Perhaps this was the first one-man apparatus crew in this country.

It is not the function of rescue men to bring out bodies; their first duty is to save life, declared W. W. Hunter, in a paper read by Secretary W. H. Grove. Eight to ten years is long enough to be a rescue man in actual work. For high efficiency in rescue training, teams should go to other mines for rescue practice.

We need to keep talking about coal and its uses, asserted W. E. E. Koepler, secretary, Pocahontas Operators' Association, at the banquet. With the assistance of West Virginia University, coal conferences have been initiated in several States, some of which have no coal but merely consume it. These conferences have developed much interest in coal and its problems.

Seminole Dam Protest Belated

Coal and railroad interests in Wyoming and Colorado are raising objections to the use of hydro-electric power from the Seminole dam. They are arousing considerable local support. Interior Department officials feel that work has gone too far on the project to consider its abandonment at this late day. They have signed a contract for the three 20,000-h.p. units that are to be installed. A transmission line has been built from the dam to Cheyenne, Wyo. Provision has been made for branch lines to Greeley, Colo., and to Guernsey, Wyo. Officials expect to be able to deliver power early next summer.

Mine Cable Break Kills 16

Sixteen miners were killed and many others seriously injured on Dec. 6 when a haulage cable in the Princess mine of the Nova Scotia Steel & Coal Co., Ltd., Sydney Mines, N. S., snapped, causing a string of 26 cars to be precipitated downgrade for a mile and a quarter. The train crashed into the shaft wall. A few who quickly realized what had happened, and jumped promptly, escaped, but a number of others who flung themselves from the plunging cars hit the walls and were thrown back under the wheels. The accident occurred early in the morning as the men were about to start work.

Alabama Boosts Coal With Window Cutouts

One of several displays arranged by the Alabama Coal Trade Extension Association in windows of the First National Bank of Birmingham as part of its campaign to combat competition from natural gas, crude oil and hydro-electric power. The association is composed not only of coal operators but also miners and railroad men. It has urged the Legislature to equalize taxes on coal as compared with laborless fuels

DOLLARS-LOST IN A MIST

How Shell Engineers And Shell Products Are Helping You Fight The Battle For More Efficient Industrial Lubrication

EVER hear the story of the little lost dollar—lost in an oily mist? It can be heard in power plants, mills, factories and in the engine rooms of steamships, wherever the mist of steam-cylinder oils of unsuitable grade or inferior quality is wasting dollars instead of saving them. Its message may be translated into terms of excess oil consumption, low engine efficiency, increased maintenance costs—all reflecting reduced profits. You *can* do something about these mist-bound dollars!

For instance—Shell Engineers have developed Shell Wolco Oils—a series of great steam-cylinder lubricants. They are more readily atomized yet highly stable and heat resistant. And they deposit less undesirable residue than most cylinder oils on the market! If you are interested in saving dollars in power—dollars in maintenance—get in touch with your nearest Shell office today. A Shell representative will give you the complete story of this finest of steam-cylinder lubricants.

SHELL WOLCO OILS

Personal Notes

HARVEY AMOS has resigned as manager of the Pocahontas Flying Service, effective Jan. 1, to become "special flying representative" of the Eastern Coal Corporation, with headquarters in Bluefield, W. Va. This is a new public relations post.

CAUDLE B. BELCHER, civil and mining engineer, Grundy, Va., has been appointed itinerant coal-mining instructor for the State of Virginia. He is a member of the Mine Inspectors' Institute of America.

A. J. BOYLE has been appointed superintendent at Jamison No. 9 mine of the Jamison Coal & Coke Co., Farmington, W. Va.

JOSEPH BROOKS has been made foreman at Blackberry and "B" mines of the Riverview Coal Co., Coalburg, W. Va.

WILLIAM COBASKY has been named foreman at Pursglove No. 5 mine of the Pursglove Gas Coal Corporation, Pursglove, W. Va.

RAY COBB, mine superintendent, West Kentucky Coal Co., Earlington, has been elected president of the Western Kentucky Mining Institute, vice W. A. VINSON, general superintendent, Hart Coal Corporation.

H. F. COOK has been appointed foreman at No. 32 mine of the Red Jacket Coal Corporation, Red Jacket, W. Va.

WILLIAM COOPER has been named foreman at Osage No. 1 mine of the Pioneer Coal Mining Co., Osage, W. Va.

W. J. CUNNINGHAM, president, Crummies Creek Coal Co., has been reelected president of the Harlan County Coal Operators' Association. Other officers renamed were: vice-president, R. E. LAWSON, general manager, Cornett-Lewis Coal Co.; secretary, GEORGE S. WARD.

S. S. DAVIDSON has been made inspector at Nos. 43 and 63 mines of the Consolidation Coal Co., Monongah, W. Va.

HARRY FRYER has been appointed foreman at Beech Bottom mine of the Wheeling Steel Corporation, Beech Bottom, W. Va.

R. H. GROSS, chairman of the board of the White Oak Coal Co., Boston, Mass., selling division of the New River Co., has been elected president of the latter company, vice S. A. SCOTT, deceased. EDWARD GRAFF, hitherto general manager, was chosen a vice-president.

L. C. GUNTER was reelected president and also treasurer of the Southern Appalachian Coal Operators' Association at its annual meeting. Other officers retained were: first vice-president, B. E. CHEELY, general manager, Southern Collieries, Inc.; second vice-president, JOHN W. WILLIAMS, president, Williams Coal Mining Co.

W. J. HEATHERMAN has been made superintendent at Blackberry and "B" mines of the Riverview Coal Co., Coalburg, W. Va.

C. V. HUNT has been named superintendent at Kingston Nos. 2, 4 and 9 mines of the Kingston Pocahontas Coal Co., Kingston, W. Va.

JOHN HUNTER has been appointed foreman at Slab Fork Nos. 4 and 5 mines of the Slab Fork Coal Co., Slab Fork, W. Va.

George W. Reed

E. G. LAW has been made foreman at the Fire Creek mine of the Susanna Pocahontas Coal Co., War, W. Va.

J. D. LILLEY has been named foreman at No. 3 mine of the Chafin-Jones-Heatherman Coal Co., Peach Creek, W. Va.

M. J. MANTZ has been appointed general manager of the Whitesville Mining Co., Whitesville, W. Va.

HARRY S. MATTHEWS, JR., has been appointed assistant general sales manager of the Pittsburgh Coal Co., vice William B. Poindexter, recently named general sales manager. THOMAS H. QUEER has been made sales promotion manager; ELMER C. STRIEBEL, Pittsburgh district sales manager; CHARLES E. MOURER, sales manager for the Cleveland (Ohio) district; and RAY V. HUNTER, Buffalo (N. Y.) sales manager.

C. P. PRIDE has resigned as mine-rescue director of the West Virginia Department of Mines at Morgantown to accept the post of safety director with the Christopher Mining Co., also at Morgantown.

GEORGE W. REED, vice-president in charge of sales of the Peabody Coal Co., has presented his resignation as chairman of District 10 Bituminous Coal Producers' Board (Illinois). This is a three-man body.

MISS JOSEPHINE ROCHE, owner of the Rocky Mountain Fuel Co., Denver, Colo., and former Assistant Secretary of the Treasury, was elected president of the National Consumers' League on Dec. 8.

R. S. SADDLER has been appointed superintendent at Vera Nos. 1, 2 and 3 mines of the Vera Pocahontas Coal Co., Iaeger, W. Va.

G. F. SCARBRO has been made foreman at Slab Fork Nos. 3 and 6 mines of the Slab Fork Coal Co., Slab Fork, W. Va.

GILBERT SMITH, vice-president, Mason Coal Co., was elected president of the New River Coal Operators' Association at its 36th annual meeting, Dec. 13. Other officers named were: Vice-president, P. C. THOMAS, vice-president Koppers Coal Co.; treasurer, P. M. SNYDER, Koppers Coal Co.; secretary-traffic manager, S. C. HIGGINS.

E. E. SPANGLER has been named foreman at the Whitesville mine of the Whitesville Mining Co., Whitesville, W. Va.

CLARENCE SPRAGGS has been appointed foreman at Consolidation Nos. 63 and 43 mines of the Consolidation Coal Co., Monongah, W. Va.

HUBERT SPRAGGS has been made foreman at Consolidation No. 38 mine of the Consolidation Coal Co., Fairmont, W. Va.

Allows Hard-Coal Rate Boost On Intrastate Traffic

Rates on anthracite moving intrastate in Pennsylvania—Docket 28,050—were found to result in undue prejudice and unjust discrimination against interstate commerce in a decision handed down late in November by the Interstate Commerce Commission. To correct the condition the Commission finds the following increases per ton to be reasonable: 3c. in rates of 84c. or less; 5c. in rates of 85c. to $1.12; 11c. in rates in excess of $1.12; 1c. in rates on unprepared anthracite shipped from mines to breakers.

These findings, the report states, are made without prejudice to the right of the authorities of the State or any other interested party to apply for a modification of the findings as to any specific intrastate rate on anthracite on the ground that it is not related to interstate rates on like traffic in such a way as to contravene the provisions of the interstate commerce act.

When informed of the I.C.C. decision, Richard J. Beamish, of the Pennsylvania Public Utilities Commission, said he would urge the State Commission to carry an appeal to the highest court. Chairman D. J. Driscoll said the State regulatory body would "use every means possible to protect the anthracite industry."

Joins Insurance Company

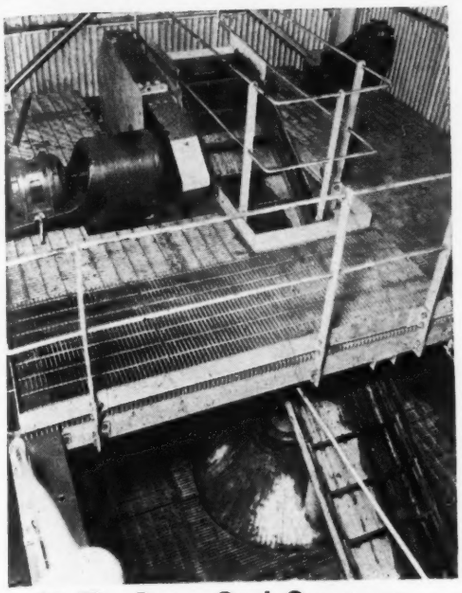
Robert D. Currie, district engineer for the U. S. Bureau of Mines, in charge of the Bureau's office in the anthracite region of Pennsylvania, has resigned to become district engineer of the General Reinsurance Corporation of New York. He will make his headquarters at Wilkes-Barre and will work throughout the hard-coal area, making inspections and cooperating with operators in safety and accident-prevention work.

Hard-Coal Stoker Sales Spurt

Statistics on factory sales of mechanical anthracite stokers show an increase of 45.2 per cent for the first ten months of 1938 over the corresponding period of the preceding year, according to the U. S. Bureau of the Census.

Commenting upon this increase, J. P. Duffy, assistant to the president of Anthracite Industries, Inc., which has been promoting the use of this type of device for automatic heat, said: "There is an ever-increasing trend on the part of the American people to heat their homes automatically, wherever it is possible for them

HOWE CONTINUOUS CENTRIFUGAL DRYER AND SLUDGE RECLAIMER



COST SAVINGS *Demonstrated* IN SERVICE

At The Perry Coal Company

Another of our continuous centrifugals installed in Illinois is processing 5/16 inch to 0 coal at the rate of 75 tons per hour. This coal enters the dryer with 25% moisture. Based on an average of 30 tests, our continuous centrifugal removed all but 2 to 3% of the free moisture.

Reduced MOISTURE and ASH CONTENT and Recovered Coal from Slurry to effect

A DAILY SAVING OF $35 TO $50

WHAT THE·· HOWE CONTINUOUS CENTRIFUGAL DRYER and SLUDGE RECLAIMER means FROM A SAVING IN CAPITAL EXPENDITURE

MORE TONNAGE PER DAY AT MUCH LESS CAPITAL OUTLAY

The Howe Centrifugal installed here not only replaces the previous and more costly facilities, but reduces moisture and ash content and recovers coal from slurry to effect large daily savings. It saves maintenance money—it saves space—it requires no heat.

CAPITAL OUTLAY HERE IS FIVE TIMES AS MUCH

It paid to discontinue these facilities regardless of their large cost because of the savings that can be made with a Howe Centrifugal.

CENTRIFUGAL AND MECHANICAL INDUSTRIES, INC.
146 PRESIDENT STREET
ST. LOUIS · MO.

"Ash content reduced 21% . . . —moisture content reduced 54%"

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to do so, with a clean, convenient, economical fuel. Definite evidence of this fact has caused many manufacturers, who heretofore had devoted their producing talents to other types of equipment, to enter the anthracite stoker manufacturing field. This additional man power is not only spreading knowledge of automatic anthracite heat to the general public but new retail outlets are being opened throughout the country."

The list of approved equipment issued by Anthracite Industries, Inc., shows 21 different stokers that have been tested and now bear the seal of approval of the organization's laboratory.

Scrip and Wage-Hour Laws Discussed by Store Men

In January, wage-hour bills will be introduced in the legislatures of 44 States, at least such are the indications, said Hull Bronson, of Washington, D. C., executive secretary of the National Industrial Stores Association, at a meeting of officers of the national association and of the regionals, held Dec. 5 and 6 at Huntington, W. Va. After outlining the proposed Ohio bill, which follows closely the national law and starts with 44 hours and $11 per week and progresses to 40 hours and $16 with time and one-half for overtime, he observed that in States passing such laws the cost of doing business in the company store will increase. Regarding the Wage and Hour Division Interpretative Bulletin No. 3, Mr. Bronson stated that apparently many of those connected with the Labor Department still think that companies pay in scrip instead of merely extending credit by tnat means. Therein lies the opportunity for an educational job. In a general discussion following the talk it was brought out that already many industrial stores in several States have shortened the "open" hours to 40 to 44 per week. Certain stores in Pennsylvania are open for seven hours per day six days per week. As regards the present national law, one large coal company takes the position that compliance will simply mean refusing scrip to any employee unless this scrip is as a credit against wages earned in excess of $17.50 per pay.

An opinon was voiced that "somewhere in Washington" there exists a small group which is determined to eliminate the use of scrip. It was brought out that the association has no complaint against the wage-hour law as such but that it is concerned with the "things that are hidden in it." Now that an employee has an opportunity to complain regarding his dealings with a company store, even though he may not be justified—and since some such case may come up for a ruling—the stores should keep all merchandise plainly priced and be prepared to justify those prices and the company store practices.

Nellis Co. Absorbed

The Nellis Coal Corporation, Nellis, W. Va., a subsidiary of the American Rolling Mill Co., has been dissolved as such as of Dec. 1, according to an announcement by Charles W. Connor, superintendent of mines. Operation of the mines will be continued without interruption, however, as part of the parent company.

Coal From Geologic Origin to Shipment Theme of Indiana Meeting

INDIANA coal seams, a new method of rock-dust protection using the dust in the original container, factors involved in the proper preparation of coal and precautions necessary in drilling oil and gas wells through coal seams were the topics at the 1938 winter meeting of the Indiana Coal Mining Institute, held Dec. 10 at the Hotel Deming, Terre Haute, Ind. H. G. Conrad was elected president for 1939, succeeding C. A. Herbert, who presided over the technical sessions. Paul Weir, consulting engineer, Chicago, officiated at the annual dinner, featured by the presentation of the John A. Templeton Safety Trophy to the officials and men of the Crown Hill No. 6 mine of the Clinton Coal Co., and an address on "Problems in Executive Leadership" by Russell J. Greenly, professor of industrial education, Purdue University, Lafayette, Ind.

L. S. Ayers & Co.

H. G. Conrad
New president, Indiana Coal Mining Institute

Sketching briefly the geological history of the earth, Wesley Harris, president, Bicknell Coal Co., Bicknell, Ind., reviewed the peat-bog theory of coal formation and pointed out that at the end of the Mississippian Period, which preceded the Pennsylvanian, the two including the major part of the Carboniferous Age, most of Indiana and parts of Illinois and Kentucky were land areas at the confluence of a number of rivers and bordering on the sea to the south. "At this time there were vast marsh areas where now are found the coal measures of the Carboniferous Age. One of these marsh areas constituted what is now known as the Eastern Interior Coal Basin, including the coal-bearing lands of Indiana." Thirty-two distinct coal horizons are found in the State, of which nine at present are of commercial importance. Of these nine, the Lower Block is the lowest and oldest, followed by the Upper Block, Minshall, Upper Minshall (or Coal II), and Coals III, IV, V, VI and VII. Each of these seams (December, 1938, *Coal Age*, p. 36) was described in detail by Mr. Harris.

"In the United States, coal stands next to the soil in the list of national resources," said Mr. Harris. "This country has more than half of the known coal deposits of the world. According to estimates of the U. S. Bureau of Mines, the coal reserves of the United States are sufficient to last for 2,000 years at the 1929 rate of consumption. It follows that, as far as favorable natural conditions are concerned, this nation should be the leading industral nation of the world and that most nations will be more or less dependent on us for the manufactured products of industry."

A need for more study of how geological findings may be related to safety in mines was stressed by John E. Jones, safety engineer, Old Ben Coal Corporation, West Frankfort, Ill., in the discussion which followed Mr. Harris' paper. In spite of progress in other directions, the history of the coal industry has shown no improvement in the fatality rate from falls of roof, indicating the necessity for some system of analyzing the characteristics of the structures above the coals so that the results may be used in the promotion of safety.

Blasts Rip Rock-Dust Bags

A new method of rock-dusting in which the dust, in the original containers—i.e., paper bags—is placed on supports near the roof equipped with vanes, triggers and rip wires for tripping the supports and tearing open the bags by the action of the pressure wave preceding the flame of the explosion was the subject of an address by Mr. Jones. This system of rock-dust protection, developed by Mr. Jones, was described in the October issue of *Coal Age*, p. 40, including a summary of the findings of the U. S. Bureau of Mines, which tested the new protective system at the Bruceton (Pa.) Experimental Mine.

Rock-dusting, said Mr. Jones, is one of the very few second-line-of-defense measures against personal injury applicable to coal mines, aside from proper first-aid treatment of the injured person. Usually prevention of injury means preventing the accident which, if accompanied by personal exposure at the same instant, results in injury. But in the case of mine explosions, if an ignition takes place in spite of preventive measures, rock dust is a definitely proved second line of defense.

Mines vary widely in their susceptibility to explosion propagation, with the majority falling in the range between non-propagation and maximum propagation. Mines with the maximum hazard now usually are well rock-dusted as a secondary defense in case the other measures fail to stop an ignition. "Those not quite so hazardous are not so well rock-dusted. The total of bituminous mines using rock dust fully or partially is approximately 10 per cent of the number in the nation; these account for nearly 40 per cent of the output." Installation of this second line of defense in other than the 10 per cent of the most hazardous operations is retarded because of the combination of rock-

Get this $200.00 Gift

WE BACK OUR CAPACITY CLAIMS WITH CASH

Show us a design of a Rotary Dump mine car (meeting conditions and specifications given herein) that will come within seven (7) cubic feet of equaling the eighty-five (85) cubic foot capacity of Sanford-Day's NEW Rotary Dump car, and we will make you a gift of TWO-HUNDRED DOLLARS ($200.00).

This Ad Should Convince You!

We want to convince you that, regardless of type of car required, ROTARIES . . . END-DUMPS . . . AUTOMATICS, S-D cars give you the maximum capacity for given over-all dimensions.

We are trying to make you CAPACITY-CONSCIOUS . . . it means cash savings to you.

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We want you to let us quote on cars for your next requirements. Send us a drawing of your present car right away and we will show you what we can do. Then you will be ready when you want to buy.

HOW TO GET THE $200.00 GIFT

We will pay $200.00 to the first person who can show us, on or before Feb. 15, 1939, a design of a Rotary Dump coal mine car (not a Sanford-Day Design) that has been in regular coal mine service in the United States prior to Jan. 1, 1939, and which, if built to the specifications shown below, would have a water-level capacity that comes within seven (7) cubic feet of equaling the capacity of Sanford-Day's NEW Rotary Dump car, built to same specifications. THIS NEW S-D CAR HAS A WATER-LEVEL CAPACITY OF 85 CUBIC FEET.

SPECIFICATIONS

Maximum dimensions of lading body of car: length inside 144″; height above top of rails 20″; width outside of side walls 72″; standard 14″ flanged wheels; sills extending longitudinally from end to end of lading body between wheels; track gauge 42″; distance from plane of top of track rails to bottom of side walls not less than 8″ ("road clearance" laterally outside of wheels). Your $200.00 check is waiting for you!

SANFORD-DAY IRON WORKS, Inc., Knoxville, Tenn., U.S.A.

Mine Cars, all types — Trailers — Sheaves — Wheels

dust cost with the reduced possibility of an explosion.

"Were it possible to install somewhat permanently rock-dust protection in such mines commensurate with their need to stop explosion propagation it is likely that a far greater percentage of the nation's mines would be so safeguarded. A big percentage of rock-dust cost grows out of its temporary effectiveness, necessitating frequent redusting. Were it possible to install the required quantity of rock dust to stop unquestionably an explosion, this dust to remain intact until liberated by the advance air wave, waste would be largely reduced." Further economy would result if it were possible to move the dust to a new location at a lower cost than purchasing and installing new dust. The remote possibility of an explosion in many operations warrants the development of a more permanent rock-dust installation providing a longer time of dust effectiveness.

The same reasons result in reduced effectiveness in dusting trackless passages in mines already using rock dust and doing a good job in tracked openings which are easy to reach with dusting machines. Consequently, there is the same need for a more permanent rock-dusting system in trackless passages in high-hazard mines. Such passages usually are more numerous than those in which track is laid. The new system therefore was designed for use in trackless passages difficult to protect with ordinary methods and for installation in mines where some hazard is present but perhaps not sufficient to warrant the cost of complete protection by present methods.

The efficacy of the bag system of protection, said Mr. Jones, was proved in an explosion Dec. 7 at the No. 15 mine of the Old Ben Coal Corporation. Occurring within a room panel, the explosion had developed terrific force by the time it arrived at the mouth. Pillars were being mined in the panel and therefore most of the original machine dusting had been destroyed. Bag units had been installed in the trackless openings at the mouth of the panel and the tracked entries thoroughly dusted by machine. As a result, the explosion was stopped within 75 ft. in either direction on the cross entry.

Give Consumer What He Wants

"Coal is mined to be sold commercially," declared M. A. Tuttle, combustion engineer, Knox Consolidated Coal Corporation, Indianapolis, Ind., in discussing certain factors to be taken into consideration in preparation, and "personally, I feel that coal preparation should be based on customer preference rather than to make up a size which so far has not been in common use and then try to revolutionize the coal-burning habits of the territory and by such action gain a momentary advantage with the trick size."

The fact that lump coal of a quality consistent with the preparation of other sizes is becoming extinct in Indiana "is regrettable." The problem at most mines "seems to be what to do with the small per cent of coal which could be loaded as lump. It seems a shame to break down to 6 in. ahead of the screen, yet to put all the plus 6 in. over the picking table involves a picking problem and a Bradford-breaker loss that is highly uneconomical for the quantity of salable coal produced. This necessitates loading an egg which is oversized on the top end. This so-called 8x3 is not such a good-looking size. A 6x4 is a much better domestic size."

The demand for commercial coal in sizes between 3 and 1½ in. is getting smaller every day. While the home stoker in most instances has replaced only gas, oil or premium lump, stokers rated at 350 lb. an hour and up have replaced the hand-fired nut sizes. There is some demand for dealer domestic nut, which should be closely screened and well cleaned, whether by hand or mechanically.

"I have seen instances where it would seem that the ash content of our coal was too low," resulting in a very thin clinker. "It has been my experience that a low-fusion coal can have too low an ash content. . . . If you are going to have a clinker to mess around with, it should be big enough to handle with a hook or else to be shoved out by the auxiliary stoker rams. The best way to accomplish this is by taking advantage of the few particles of coal with boney ash. This boney structure usually is of extremely high-fusion composition and really is an aid in supporting an ash bed."

Dating from the Illinois shaft strike of 1932, the No. 3 nut sizes (1½ or 1¼x¾ or modifications) have become increasingly important to Indiana producers. Used largely in plants having old equipment with poor draft conditions and undersized grates, these coals do not have to be highly refined, but should be well sized. Many operators thought that No. 3 nut would be suitable for domestic stokers, "but it has not worked out satisfactorily.

"The crying need of the retail dealers seems to be a brand-new size something like 1x¼- or 1x$\frac{5}{16}$-in. stoker coal with a minimum of ash. There may be a few operations in Indiana where the small size can be dry-screened out of raw screenings. But, since for most of us the ash content increases as the sizes decrease, the coal necessarily will have to be mechanically cleaned if Indiana is forced to prepare this size to hold its market. . . . Such sizing refinement is not so important for stokers suitable for apartment houses, school buildings or small laundries, which burn 300 to 600 lb. per hour, although freedom from rocks and tramp iron still is necessary." However, "the Indiana coal industry would be better off today if the screw-feed stoker never had been built. It has cost us our egg and nut markets." From the standpoint of external treatment, Mr. Tuttle expressed the hope that "if anybody has found a dustless preparation which will last on our Midwest coals for six weeks, I wish he would get in touch with our purchasing agent."

Keep Gas From Coal Seams

While a drillhole hundreds of feet into the earth is a wondrous thing and cuts through formations that may be of unthought-of value to mankind in the future, it also is a connecting link between strata which should be kept separate, such as coal seams from other strata giving off water, gas, etc., said D. D. Wilcox, general superintendent, Superior Coal Co., Gillespie, Ill., in discussing the precautions which should be taken in drilling oil and gas wells through coal seams.

"The primary reason, of course, for precaution in drilling or plugging of gas and oil wells is the safety of the mine employees. No one but the operator of the mine has this responsibility, and, while the driller or operator of an oil well may accept the moral responsibility, the law makes this a duty of the mine management. The oil and gas interests ought to be required to accept and pay for the cost of their negligence. With the splendid advances made in the last decade in accident prevention in Illinois and Indiana it would seem that this phase should not be neglected. That there is a distinct danger is readily disclosed by the records and that there has not been a catastrophe has been due largely to the care of the local management of the mines rather than adequate care of the wells. The danger created has been not only from gas and oil but also from water."

Regulations in drilling which in his opinion should be enforced were discussed by Mr. Wilcox under the following heads: (1) Every oil and gas drillhole should be located exactly; (2) no holes should be drilled through a mine, prospective mine or abandoned mine without approval and permission of the State mining department; (3) drilling and casing through coal seams should be by a method that will insure the safety of the coal miners of the future; (4) abandoned wells should be plugged; (5) supervision of drilling

Institute Officers

H. G. Conrad, general manager, Knox Consolidated Coal Corporation, was elected president of the Indiana Coal Mining Institute at the Terre Haute meeting, Dec. 10. Mr. Conrad succeeds C. A. Herbert, chief supervising engineer, Vincennes Station, U. S. Bureau of Mines. Other officers and board members were chosen as follows:

Vice-Presidents—R. A. Templeton, vice-president, Templeton Coal Co.; Thomas W. Faulds; and H. A. Cross, general superintendent, Walter Bledsoe & Co.

Secretary-treasurer — Harvey Cartwright, commissioner, Indiana Coal Operators' Association (reelected).

Members of the executive board—A. K. Hert, superintendent, Snow Hill Coal Corporation; F. M. Schull, Binkley Mining Co.; David Ingle, Jr., superintendent, Buckskin Coal Corporation; D. W. Jones, superintendent, Princeton Mining Co.; Birch Brooks, superintendent, Saxton Coal Mining Co.; and Mr. Herbert.

Safety Trophy Awarded Clinton Coal Co.

Hanging up a record of only seven lost-time injuries involving a total lost time of 146 days, the officials and employees of the Crown Hill No. 6 mine of the Clinton Coal Co., Clinton, Ind., were presented with the John A. Templeton Trophy, awarded annually by the Indiana Coal Operators' Association for the best safety record of the year, at the meeting of the Indiana Coal Mining Institute, Terre Haute, Ind., Dec. 10. Working 237,136 man-hours, No. 6 mine came out with a severity rate of 0.61, a frequency rate of 29.51, and a safety grade of 92.27 per cent. The Clinton Coal Co. is headed by H. M. Ferguson, with D. W. Hayes as general superintendent.

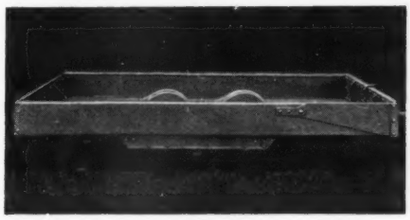
CHANGE WEIGHT LOAD TO PAY LOAD

MAN-TEN *Dipper scoops ore* at 40% less cost. Increases shovel capacity 66-2/3%, weighs less, has 1/3 greater abrasion resistance, and double the corrosion resistance of mild steel. Shovel now handles 12 cu. yd. extra payload with no change in power equipment.

HOW about your product? Is it still handicapped by the drag of dead weight? Is it rusting out or wearing out before it should?

In U·S·S MAN-TEN and U·S·S COR-TEN, we offer two high-efficiency steels that have pioneered in the get-rid-of-dead-weight campaign — and that translate weight reduction into greater capacity, lower operating costs, and increased revenues for the user.

Both these steels are low-cost, low-alloy steels having about twice the yield point of structural steel. Both are tough and hard-wearing—highly resistant to shock and vibration. U·S·S COR-TEN has unusually high resistance to atmospheric corrosion —4 to 6 times that of plain steel. U·S·S MAN-TEN equals copper steel in its ability to resist rusting.



COR-TEN mine car weighs 19% less. These cars stand but 20" above the rail yet have full capacity of 105 cu. ft. They weigh 525 lbs. less than those built of ordinary steel, have much greater resistance to atmospheric corrosion.

Trucks, trailers, tractors and mine cars built with these steels have been reduced as much as 30% in weight—now haul that much extra payload at no extra cost, and are as strong, safe and lasting as before.

In steam shovels, grab buckets and similar equipment, improved design with U·S·S High Tensile Steels has increased capacity up to 66% without increasing weight.

Find out how these steels can be applied to your equipment — how little they cost to use—our engineers will gladly go over your designs and assist you in making the most economical applications.

U·S·S HIGH TENSILE STEELS

AMERICAN STEEL & WIRE COMPANY, *Cleveland, Chicago and New York*
CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
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TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham*

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and plugging should be in the hands of competent State employees, preferably of the mining department; and (6) proper records of drilling operations should be made and filed.

Reiterating his contention that the problem is pressing and serious, Mr. Wilcox concluded his address with the suggestion that some agency should be set up to locate all abandoned wells so that they may be marked on the mine maps. When an abandoned well is found, the one safe course is to assume that it has not been plugged.

Discussion following the paper found those participating in complete agreement that adequate legislation is an immediate necessity in Indiana in view of the recent boom in drilling in the State.

Aids Air-Filter Research

An industrial fellowship in air-filter research has been established in Mellon Institute, Pittsburgh, Pa., by the American Air Filter Co., Inc., according to an announcement by Dr. Edward R. Weidlein, director of the institute. The feliowship will investigate broadly materials of value in the construction of filters for air-conditioning systems, cooperation being available from specialists on the staff of the Multiple Industrial Fellowship on air hygiene in operation at the institute. Dr. Frank F. Rupert, who has been a member of the institute since 1913 and formerly a junior chemist in the U. S. Bureau of Mines, has been appointed to the incumbency of the fellowship.

Coal Commission Launches Final Act In Task of Setting Prices

WASHINGTON, D. C., Dec. 16—Procedure for establishing minimum prices and marketing rules and regulations for bituminous coal under the Guffey-Vinson Act reached its final stage this week. Representatives of district boards for the Rocky Mountain and Pacific Coast regions convened with the National Bituminous Coal Commission last Monday to begin coordinating their proposed prices and regulations, as approved for the purpose after the Commission had revised them in accordance with evidence adduced in the recent public hearings. Minimum Price Areas 6, 7, 9 and 10 (comprising districts 16 to 20 and 22 and 23) are affected by this conference.

As the conference opened, Commission Chairman Tetlow placed at the disposal of the boards the mass of freight-rate data, coal-distribution statistics and other material collected by the Commission, necessary to the board members in effecting coordination. The coordinators were directed to keep records of the reasons for any modifications in the proposed prices or marketing rules, found necessary for coordination, in order that such changes may be justified in the Commission's final hearing. The boards were cautioned to complete coordination within ten days.

The hearing on proposed minimum prices in Areas 2, 4 and 5 (comprising western Kentucky, Illinois, Indiana, Iowa, Missouri, Kansas, Arkansas, Oklahoma and Texas) was concluded in Chicago on Dec. 6. Presentation of voluminous data and exhibits, as well as numerous protests, caused the sessions to drag more than three weeks.

The U. S. Court of Appeals for the District of Columbia delivered an opinion on Dec. 5 sustaining the decision of the U. S. District Court for the District of Columbia denying a petition by the Utah Fuel Co. and 21 other coal companies to enjoin the Commission from making public individual cost production figures (*Coal Age*, October, p. 84, and November, p. 62). The appellate court ruling, written by Justice Miller, held that the determination made by the Commission in this matter was within its discretionary administrative powers and not reviewable by the courts; that this had already been determined in the Mallory case (*Coal Age*, September, p. 60), which was identical in substance to the Utah case, and that this attempt by indirection to get what had already been decided against could not be achieved in the appellate court. The court suggested that the companies exhaust administrative remedies before seeking judicial review or intervention.

In denying a petition for a rehearing of the Utah Fuel case on Dec. 12, the Court of Appeals stipulated that its mandate be stayed until Jan. 10, the previous temporary injunction remaining in effect pending application for certiorari.

Review Sought in Utah Case

A petition for a writ of certiorari was filed in the U. S. Supreme Court Dec. 16 by counsel for the Utah Fuel Co., et al., asking review of the appellate court decision. A conference of counsel held in chambers before Chief Justice Hughes indicated that the case will be expedited as much as possible.

The Commission, in an order dated Dec. 14, postponed to a date to be later designated by further order the making available for inspection of individual cost reports in all minimum price areas. The Commission had previously directed that reports of producers in Minimum Price Areas 1, 2, 3 and 5 be made available in Washington on Dec. 15 and that those of producers in areas 4, 6, 7, 9 and 10 be made available in Denver, Colo., on the same date.

Provisional approval as marketing agencies were granted by the Commission on Nov. 28 to Southern Illinois Coals, Inc., and the Kentucky Coal Agency, Inc. The latter organization, which will handle western Kentucky coals, will have headquarters in Madisonville and plans to be in operation by Jan 1; H. C. Moore, formerly connected with the marketing division of Appalachian Coals, Inc., has been elected president. Sentiment for the creation of a marketing agency in southern Colorado also is said to be increasing; George B. Dick, general manager, Dick Coal Co., asserted that southern Colorado and New Mexico producers would organize such a corporation if competitive districts adopted the idea.

Permission was accorded on Nov. 29 to 28 Iowa companies to withdraw applica-

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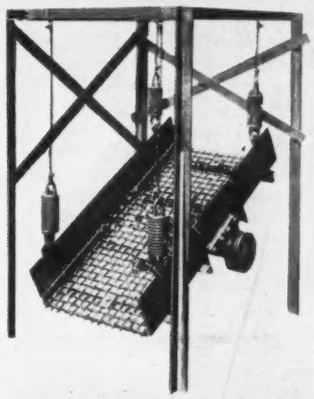
a husky screen for scalping and sizing at capacities up to 1000 T. P. H.



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a highly efficient small screen. The 2' x 4' size at $165.00.

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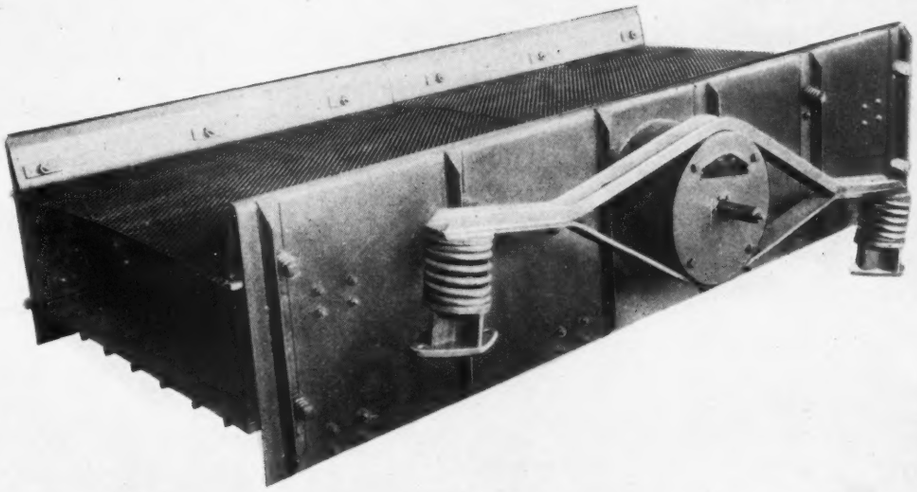
STYLE H

best for fine screening at high speed. Adjustable slope and stroke.



Pick your screen to suit the job. All three screens have uniform circular motion at every point of surface. High in efficiency, low in power requirements.

ROBINS MAKES Belt, Chain and Pivoted Bucket Conveyors, Bucket Elevators, Hoists, Grab Buckets, Mine Conveyors, Screens, Crushers, Gates, Feeders, Chutes and all their parts and accessories.

ROBINS DESIGNS and builds complete systems for handling coal in large and small mines, tipples and preparation plants. Request bulletins on equipment of interest to you.

Ask a Robins representative to call.

SEND FOR COAL BULLETIN

ROBINS CONVEYING BELT COMPANY
15 Park Row New York, N. Y.
Offices in principal cities

MATERIAL HANDLING ROBINS EQUIPMENT

tions seeking exemption from the provisions of Sec. 4 and the first paragraph of Sec. 4-A of the coal act, such permission being without prejudice to future right to file application for exemption.

Progressive Labor Complaint Presents Novel Issues

Novel issues were presented in a complaint to the National Labor Relations Board filed on Dec. 8 by the International Union, Progressive Mine Workers, against the Wyatt Coal Co., operating in Kanawha County, West Virginia. The complaint charges the company with unfair labor practices under the National Labor Relations Act and demands that the company be ordered to bargain collectively with the union on reinstatement of two employees discharged by the company.

According to the complaint, these miners, who were and are members of the Progressive union, then employed at the Wymar mine of the company, were discharged on Aug. 22, 1938. They thereupon took up their case with the West Virginia Department of Unemployment Compensation, which decided that the men had been unjustly discharged. A grievance committee then was appointed by Local 201, District 2, of the Progressive Mine Workers to take up with the company the terms and conditions of reemployment of the two discharged men. According to the papers filed with the Labor Board, this local represents more than a majority of the 260 miners employed at the Wymar mine.

The company refused to meet or bargain with the grievance committee of the union. John Laing, president of the company, explained that it is a member of the Kanawha Coal Operators' Association, which has a contract with the United Mine Workers covering all companies belonging to the association. This contract does not expire until March 31, 1939. Mr. Laing held that recognition of the Progressive union local as collective bargaining agent for the miners at the Wymar mine might be regarded as a violation of this contract.

The purpose of the latest complaint is to demand of the Board that it take jurisdiction and decide whether the company in refusing to recognize the local of the Progressive union as collective bargaining agent for the Wymar mine employees and in refusing to bargain with the grievance committee of this local in the case of the two unjustly discharged miners is guilty of unfair labor practices under the National Labor Relations Act.

Industrial Notes

OWENS-ILLINOIS GLASS CO. and CORNING GLASS WORKS, leaders in their respective fields of glass production, have formed the OWENS-CORNING FIBERGLASS CORPORATION, which will produce a variety of products made from fiber glass, including insulation for electrical circuits and equipment (motors, etc.).

HORACE T. POTTS CO., Philadelphia, Pa., has appointed Beals, McCarthy & Rogers, Buffalo, N. Y., and Equitable Equipment Co., New Orleans, La., as jobbers in the Elastuf group of related machinery steels.

CATERPILLAR TRACTOR CO., which recently transferred W. O. Bates, Jr., from its San Leandro (Calif.) office to become head of its patent department at Peoria, Ill., has appointed him a vice-president.

W. A. TIPTON, manager of packing sales of the Mechanical Goods Division, UNITED STATES RUBBER PRODUCTS, INC., has been appointed a director of the rubber division of the Mechanical Packing Association.

CARNEGIE-ILLINOIS STEEL CORPORATION has made Howard V. Clark manager of sales of the sheet division of the corporation's general sales department. Formerly general manager of the order division, Mr. Clark succeeds Avery C. Adams, resigned.

WORTHINGTON PUMP & MACHINERY CORPORATION has appointed Walter B. Strong assistant general sales manager. A member of the organization since 1920, Mr. Strong has been manager of the export division. George Gellhorn, Jr., takes over the latter post.

DART TRUCK CO. Kansas City, Mo., has appointed Bruce P. Smith as vice-president in charge of sales with headquarters at 520 North Michigan Ave., Chicago. He has had wide acquaintance in the coal-stripping, iron-ore construction and industrial fields through his former connection with the Western Wheeled Scraper Co. and its successor, the Austin-Western Road Machinery Co.

ALEXANDER MILBURN CO., Baltimore, Md., manufacturer of spray finishing equipment and cutting and welding apparatus, has appointed Frank P. Snyder as sales representative in Detroit, Mich. He was formerly sales engineer for the DeVilbiss Co.

OHIO BRASS CO. announces that, effective Jan. 3, its Chicago office, formerly at

Permissible Plates Issued

SIX approvals of permissible equipment were issued by the U. S. Bureau of Mines in November, as follows:

Jeffrey Mfg. Co.: Type 35-20 shortwall mining machine; 20-hp. motor, 440 volts, a.c.; Approval 357-A; Nov. 2.

Sullivan Machinery Co.: Type 10-B shortwall mining machine; 25-hp. motor, 220 and 440 volts, a.c.; Approvals 358 and 358-A; Nov. 7.

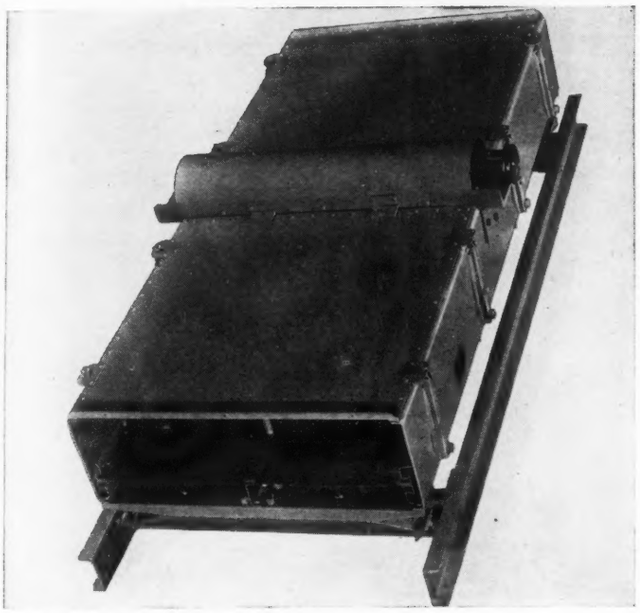
Goodman Mfg. Co.: Type 612-AT shortwall mining machine; 20-hp. motor, 250 volts, d.c.; Approval 359; Nov. 16.

Jeffrey Mfg. Co.: Type 61-W conveyor; 15-hp. motor, 415 volts, a.c.; Approval 360-A; Nov. 17.

Jeffrey Mfg. Co.: Type 44-EE loading machine; 10- and 15-hp. motors, 250 and 500 volts, d.c.; Approvals 361 and 361-A; Nov. 26.

Jeffrey Mfg. Co.: Type 35-20 shortwall mining machine; 20-hp. motor, 500 volts, d.c.; Approval 344-A; Nov. 29.

IT'S SURE TO
LAST A LONG TIME



BUILT BY UNIVERSAL VIBRATING SCREEN CO.

"The longer manufacturers use SKF Bearings, the more they appreciate their many advantages" is particularly true of the Universal Vibrating Screen Company. For many years they have obtained the same dependable SKF performance that helps this Type M 42" x 96" Vibrating Screen make separations from 2½" clear openings down to ⅛" on feeds of any size up to 7" at 1800 r.p.m.

Not only do SKF Bearings have the inherent property of self-alignment, but they withstand intensive vibration with no binding or cramping. Consequently, a close machine fit of seals is possible. In addition, they are well protected against lubricant leakage and keep out dust, dirt and moisture. When you buy a Universal Screen, you can depend on bearings that are veterans in screen service. 4239

SKF INDUSTRIES, INC., PHILADELPHIA, PA.

THE BEARINGS ARE
SKF

BALL & ROLLER BEARINGS

20 North Wacker Drive, will be at 1580 Continental Illinois Bank Building, 231 South LaSalle St. Claude R. Kingsbury has been transferred to Seattle, Wash., vice J. W. Watkins, who is leaving the employ of the company.

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Advance in Accuracy Shown in Commission Cost Studies

By PAUL WOOTON
Washington Correspondent, Coal Age

Most observers are willing to concede that the National Bituminous Coal Commission in its second effort to establish prices has maintained a high standard of accuracy and that its hearings have been fair to all concerned, in line with the requirements prescribed by the court. The law places the responsibility of determining costs on district boards. The Commission is instructed to ascertain costs in the base year of 1936. Then the boards are instructed to determine how much adjustment must be made in these costs to reflect present conditions resulting from changes of wage rates or other factors.

Early attempts under the first Guffey act and the first price orders of the present Commission were done largely by estimate. The district boards would take the base costs and by dignified guesswork figure out how much they had increased since the 1936 starting point. So much was left to the imagination that results were hard to justify. For instance, in October, 1937, when the district boards were required to determine the adjusted costs, the boards in Price Areas No. 1 and No. 2 made calculations that proved to have been as much as 7c. a ton higher than actual cost. At that time there were no data on actual costs, so the board had to proceed by estimate. Wages had been advanced about 10 per cent on April 1, 1937. Many other factors of cost had changed.

In its present determinations the Commission has emphasized the importance of actual records for the purpose of checking these adjustments. Hence the Commission collected and made available to the boards the actual costs on approximately 95 per cent of the total output of coal for the entire period of 1937 following the wage increase in April. This gave a basis of solid fact. It is agreed by those who attended the hearings that it lifted the discussion out of the realm of speculation.

At the same time the reports submitted by individual producers and the tabulation of the district statistical bureaus of the Commission were subjected to careful audit by the Commission's Washington staff. The records also were opened to the Consumers' Counsel under his statutory duties. The office of the Consumers' Counsel examined them and questioned hundreds of items that appeared to be out of line. Each of those items was examined. When a satisfactory explanation was not forthcoming they were disallowed. The Commission's findings show in full the effect of these disallowances on district costs.

Much attention was given in the testimony and cross examination to the matter of selling costs. The Commission is instructed by law to determine the cost of production, to which is to be added a reasonable cost of selling. The record shows that the selling cost is highly complex and that it may vary greatly from mine to mine and from district to district, depending upon the circumstances of the sale and on the relative importance of various kinds of sales making up the business of any one district.

Previous hearings of the Commission on questions of distributors' discounts disclosed a great variety of opinion as to what constitutes a reasonable selling allowance. In recent hearings the approach made by the district boards and the Commission was to try to develop what were the actual costs of selling incurred by producing companies. It was the opinion of the experts of the district boards that the actual selling costs, as shown by the books of companies, may not show the full cost of selling because many producers who sell to wholesalers have no record of the amount of discount obtained by these wholesalers. Nevertheless, the witnesses of the boards were of the opinion that the best measure of reasonable selling cost at present available is the actual cost incurred, computing the weighted average for each district.

Representatives of consumer interests and attorneys for the Consumers' Counsel were inclined to doubt if actual costs would necessarily be reasonable. Actual costs might include wasteful competitive practices. They pointed out there might be an element of profit involved in cases where the producing company sold its output through a subsidiary. Examination by the Consumers' Counsel also brought out that selling costs have been increasing.

Nevertheless, the record contains an impressive body of evidence of actual costs incurred and again the discussion has been lifted out of the realm of guesswork and placed upon a solid factual basis. The actual selling cost found by the Commission from district to district ranged from 5c. a ton to as high as 29c. in District 14. The business of this latter district is almost exclusively for domestic use and moves in small lots. The average selling cost for the industry as a whole appears to be approximately 10c per ton.

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New Preparation Facilities

CRESCENT COAL CO., Crescent Mine, Bevier, Ky.: Contract closed with Morrow Mfg. Co. for six-track tipple and washing plant, with equipment including apron

Railroads Set New Record In Coal Efficiency

Railroads of the United States achieved a new record for efficiency in the use of coal during the first nine months of 1938, according to a report on Nov. 27. The Association of American Railroads announced that during that period the carriers hauled 8 4/5 tons of freight and equipment one mile for each pound of coal consumed in freight service. In the passenger service, 14 7/10 lb. of coal provided power to haul one passenger-train car 1 mile. Factors considered by the association to be responsible for this efficiency are scientific selection of coal, improved construction of locomotives and better methods of railroad operation.

"WE *Watch* COMPARATIVE MAINTENANCE COSTS...

...*and use* GULF'S *higher quality* LUBRICANTS to keep them down" SAY MINE OPERATORS

"We DISTINGUISH CAREFULLY between LUBRICANTS costs and *LUBRICATION* costs," says this mine operator. "We bring comparative maintenance costs into the picture when we figure our *final* lubrication costs. If maintenance is low while production holds at a steady pace — or increases — we know our *real* lubrication costs are low, even though we've paid a few cents more per gallon for quality lubricants."

That far-sighted viewpoint is helping scores of mine operators, from Maine to Texas, secure the economies management demands today in operating costs. And it logically leads them to the use of Gulf's higher quality oils and greases. Mine managers find that when these better grades of lubricants are applied as recommended by an experienced Gulf engineer, production flows more smoothly, less time is lost for adjustments and repairs, and maintenance costs are lower. After Gulf quality lubricants have been placed in service, it is not uncommon for mine managers to report savings in maintenances alone amounting to many times the total monthly bill for lubricants!

So we suggest that you *watch comparative maintenance costs* from month to month in your mine, and ask a Gulf engineer to assist you in finding ways to effect savings through improved lubrication. He will work tactfully with your operating men — and they can benefit from his broad experience in the lubrication of machinery similar to yours. Gulf Oil Corporation — Gulf Refining Company, Gulf Building, Pittsburgh, Pennsylvania.

GULF INDUSTRIAL LUBRICATION

conveyor, shaking screens, loading booms, vibrating screens, raw-coal conveyor, Morrow-Prins washer to handle 100 tons per hour of 2x0-in. coal, dewatering screens, sludge-handling system and refuse conveyors; capacity, 150 tons per hour of mine-run.

WALTER S. RAE, strip mine near Jackson Center, Pa.: Contract closed with Morrow Mfg. Co. for reciprocating plate feeder, apron conveyor, shaking screens, rescreen conveyor and loading chutes; capacity, 125 tons per hour of mine-run.

NLRB Issues Desist Order; Employee Group Banned

An order was issued on Nov. 25 by the National Labor Relations Board against the Crowe Coal Co., operating a strip mine at Clinton, Mo., requiring the company to cease and desist from discouraging membership in the United Mine Workers, District No. 14, and from all other unfair labor practices, and, affirmatively, to offer immediate reinstatement with remedial back pay to former employees who were discharged in October, 1935, because of activities in behalf of the U.M.W. Excluded from the computation of back pay under the terms of the Board's order will be a period of four or five months which the U.M.W. permitted to elapse between the date of its last attempt to have the four men reinstated and May 4, 1937, the date when the U.M.W. filed charges with the Board.

The West Kentucky Coal Co., Sturgis, Ky., has been ordered by the Board to disestablish two chapters of an employees' bargaining association and return to miners approximately $86,000 checked off for association funds. The order also provided for the reinstatement of five employees who complained that they were discharged for activities in behalf of the United Mine Workers. All employees of the company, the board said, had been required to belong to the employees' mutual benefit association and dues collected by the check-off system amounted to $2,200 a month. The company was directed to repay all dues collected since July 5, 1935.

Assail St. Lawrence Waterway

Strong opposition to the proposed treaty with Canada for the construction of a Great Lakes-St. Lawrence River waterway was voiced at a meeting of the Coal Division of the American Mining Congress, Dec. 2 and 3, at Pittsburgh, Pa. The conferees passed a resolution and urged that mining men through the United States furnish a copy to their Senators and Representatives, pointing out the harmful consequences of the project. The resolution is as follows:

"We submit that the proposed treaty, which contemplates a channel 27 ft. in depth to the ocean and an immense hydroelectric power development along the St. Lawrence River, is uneconomic and unsound.

"We urge the opposition of every coal and mineral producer against this proposal, which will greatly increase the present excessive tax load on industry; increase the cost of our basic fuel, which is coal, through increased taxation and freight charges; bring no benefit to our export coal trade; permit importations of coal from Black Sea ports of Russia and other low-living-standards countries; permit heavy importations of low-cost petroleum from Venezuela and Mexico; and, through unneeded development of hydroelectric power, displace millions of tons of coal production and take work away from the thousands of coal miners and railroad workers.

"The competition of such a waterway with existing transportation facilities would seriously cripple our railroads, the plight of which is today one of our gravest national problems. The heavy diversion of water to the St. Lawrence River would also seriously harm the facilities of the Mississippi Valley waterways for the carrying of coal and other freight."

Koroseal Makes Debut

A new synthetic material, known as koroseal, compounded from coke, limestone and salt, made its social debut during the last week of November at the "Rubber Ball," sponsored by the Akron (Ohio) Chamber of Commerce with the aid of the city's major rubber companies. The new material was discovered by the B. F. Goodrich laboratories after six years of research. The research men also have found that almost every fabric on the clothing list can be coated with koroseal by a process called duranizing and be rendered sunproof, waterproof, odorless and washable. In addition to a low-cost potential, the new materal also possesses unusual resistance to corrosion and, unlike rubber, can be used in connection with petroleum.

Stoker Units Lead in Chicago

Permits were issued by the Chicago Smoke Department in November last for 110 new heating installations, of which 86 were for bituminous underfeed stokers; 9 hand-fired coal installations under fuel agreements; 4 spreader stoker installations; 4 gas installations, and 7 oil-burner installations. October, with installations totaling 119, it was said, was the best month of the year for the sale of stokers in the windy city. The figures do not include small stoker installations for residences and two-flat dwellings, for which permits are not required.

Given Wire Rope Award

Years of study and experimentation on wire rope have been rewarded by the bestowal on Walter R. Bloxdorf, metallurgist of the Macwhyte Co., Kenosha, Wis., of the Wire Association award for the outstanding contribution to the industry in 1938. A bronze plaque was presented to Mr. Bloxdorf by the board of directors of the National Metals Congress, of which the Wire Association is an affiliate, at its annual convention in Detroit, Mich. The basis for the award was a paper by the winner covering in a broad and inclusive manner the metallurgic processes in the manufacture of wire rope.

Eye Test Prevents Shamming

To protect both employer and employee in cases involving claims or suits for damages for alleged eye injuries an eye-shamming test has been made available by the American Optical Co., Southbridge, Mass., which determines instantly and beyond doubt whether or not an eye has actually suffered loss of sight. Furthermore, the test determines the visual acuity of the eye.

The functioning of this test is dependent on the use of Polaroid, a recently developed material which has the power to polarize light so that it vibrates in one plane only. The equipment used consists of a projector, a small screen in which to project test letters, Polaroid spectacles, and a cross slide equipped with Polaroid lenses for use in the projector. By taking advantage of Polaroid's ability to harness light rays, it is possible for an examiner to cut off a subject's line of sight between either eye and letters projected on the chart, all without the subject's suspecting it; in other words, the subject does not know with which eye he is seeing. It is thus impossible for him to fake an injury to either eye.

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Trade Literature

BULLETIN BOARDS—Mine Safety Appliances Co., Pittsburgh, Pa. Bulletin describes boards for safety and general bulletins, built of 24-gage steel, finished in green enamel and available in either single- or double-board types.

MATERIALS HANDLING SYSTEMS — Gifford-Woods Co., Hudson, N. Y. (Bulletin 138, 16 pp.). Illustrates application of conveying machinery to a wide range of industries, featuring five essential steps in the selection of systems: survey, design, proposal, installation and maintenance.

MECHANICAL RUBBER GOODS—Goodyear Tire & Rubber Co., Inc., Akron, Ohio (Catalog A-3424, 56 pp., illustrated). Contains data on construction and application of various mechanical goods, besides giving hints on proper care of rubber belting and maintenance of belting service records.

MINE HEADLIGHTS—Ohio Brass Co., Mansfield, Ohio. Booklet 655-MD (16 pp.) covering new incandescent mine headlight developments, contains information on new resistance designs, focusing mechanisms and introduces a new permissible explosion-proof headlight and its accompanying gas-proof resistance.

MINE HOISTS—Nordberg Mfg. Co., Milwaukee, Wis. Bulletin 83 (40 pp.) covers hoists built in single- and double-drum types with cylindrical, conical or cylindro-conical drums; also reel hoists with flat rope; units available for either electric, steam or compressed-air drive.

MINING EQUIPMENT — Cincinnati Mine Machinery Co., Cincinnati, Ohio (Catalog No. 38, 84 pp., illustrated). Lists chains, bars and bits for regular and thin-kerf coal cutting, with descriptions and operating data.

OPPOSED IMPELLER SERIES PUMPS—De Laval Steam Turbine Co., Trenton, N. J. (Catalog B-3, 12 pp., illustrated). Describes salient features, with engineering data, of these units, which have two single

suction impellers and mounted with the suction openings facing in opposite directions toward the end of the shaft.

PIPE JOINING AND REPAIRS — S. R. Dresser Mfg. Co., Bradford, Pa. (Form 382A, 12 pp.). Contains helpful information on how to construct and maintain pipe lines; describes Dresser pipe couplings for the joining of new lines and repair clamps and sleeves for the repair of old lines; and shows "before and after" pictures.

POLYPHASE INDUCTION MOTORS—Burke Electric Co., Erie, Pa. Folder describes by word and picture a wide range of units, from 1 to 1500 hp.

SLURRY AND SLUDGE PUMPS—Morris Machine Works, Baldwinsville, N. Y. Bulletin 173 (4 pp.) explains the design of centrifugal pumps for handling slurry, sludges and similar abrasive mixtures; showing the construction that permits operation with suction lift while preventing escape of material through the suction while the pump is shut down. Included are a sectional drawing with complete part list and performance tables for both belt- and motor-driven units.

STEAM TURBINES—DeLaval Steam Turbine Co., Trenton, N. J. (Catalog C, 20 pp., illustrated). Describes small units for driving auxiliary machinery, such as generators, pumps, fans, etc., the design being specially adapted to the use of high-pressure, high-temperature steam by locating the steam chest in the upper part of the casing cover, where it is above and well removed from the bearings

STEEL PRODUCTS—Joseph T. Ryerson & Son, Inc., Chicago. Stock list for 1939 (248 pp.) gives complete listings and descriptions of Certified steels and allied products carried in stock, including beams channels, angles, plates, bars, strip steel, cold finished bars, alloys, tool steels, flat wire, stainless steel, mechanical and boiler tubing, welding rod and wire, bolts, rivets, etc. Included are handy reference tables, weight charts, standard specification listings, etc.

TRACTOR-POWERED CRANE—R. G. LeTourneau, Inc., Peoria, Ill. Six-page folder depicts advantages of lifting and carrying heavy loads with tractor power.

WIRING ACCESSORIES—Ideal Commutator Dresser Co., Sycamore, Ill. Sec. 562 P. L. & R. (6-pp. folder) portrays wire and cable strippers, lugs and connectors. Form TG 515 (12-pp. folder) tells about Ideal "Thermo-Grips" for quick, safe and economical soldering.

Coal-Mine Fatality Rate Recedes Again

Accidents at coal mines of the United States caused the deaths of 59 bituminous and 15 anthracite miners in October last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors. With a production of 34,900,000 tons, the death rate among bituminous miners was 1.69 per million tons, compared with 3.80 in the corresponding month of last year.

The anthracite fatality rate in October was 3.60, based on an output of 4,169,000 tons, as against 4.54 in October a year ago.

For the two industries combined, the death rate in October last was 1.89, compared with 3.87 in October, 1937.

Fatalities during October last, by causes and States, as well as comparable rates for the first ten months of 1937 and 1938, by causes, are shown below.

UNITED STATES COAL-MINE FATALITIES IN OCTOBER, 1938, BY CAUSES AND STATES

State	Underground: Falls of Roof	Falls of Face	Haulage	Gas or Dust Explosions	Explosives	Electricity	Mining Machines	Other Causes	Total Underground	Persons Falling Down Shafts	Open-cut and Surface	Grand Total
Alabama	2	..	..	..	..	2	..	..	4	..	..	4
Colorado	..	1	..	..	..	..	..	..	1	1	..	2
Illinois	1	..	1	..	..	..	..	..	2	..	..	2
Kentucky	2	1	1	..	..	..	..	..	4	..	..	4
Maryland	1	..	..	..	..	..	..	..	1	..	..	1
New Mexico	..	..	..	..	..	..	..	..	..	1	..	1
North Dakota	..	..	..	..	1	..	..	..	1	..	..	1
Ohio	2	..	..	..	..	..	..	..	2	..	..	2
Oklahoma	..	..	..	..	..	..	..	..	..	..	1	1
Pennsylvania (bit.)	4	1	1	1	..	..	..	..	7	..	..	7
Virginia	3	..	..	..	..	1	..	..	4	..	..	4
West Virginia	23	2	1	..	..	2	1	..	29	..	..	29
Wyoming	1	..	..	..	..	..	..	..	1	..	..	1
Total (bituminous)	39	5	4	1	1	5	1	..	56	2	1	59
Pennsylvania (anthracite)	7	3	3	..	..	..	..	2	15	..	..	15
Total	46	8	7	1	1	5	1	2	71	2	1	74

FATALITIES AND DEATH RATES AT UNITED STATES COAL MINES, BY CAUSES*

January-October, 1937 and 1938

Cause	Bituminous: Number Killed 1937	1938	Killed per Million Tons 1937	1938	Anthracite: Number Killed 1937	1938	Killed per Million Tons 1937	1938	Total: Number Killed 1937	1938	Killed per Million Tons 1937	1938
Falls of roof and coal	498	358	1.352	1.324	102	102	2.421	2.767	600	460	1.462	1.497
Haulage	195	111	.529	.411	24	19	.570	.516	219	130	.534	.423
Gas or dust explosions:												
Local	16	18	.044	.067	...	2	.....	.054	16	20	.039	.065
Major	95	60	.258	.222	...	18	.....	.488	95	78	.232	.254
Explosives	36	20	.098	.074	14	11	.332	.299	50	31	.122	.101
Electricity	43	33	.117	.122	5	2	.119	.054	48	35	.117	.114
Machinery	27	17	.073	.063	2	...	.048	.....	29	17	.071	.055
Shaft	13	6	.035	.022	4	3	.095	.081	17	9	.041	.029
Miscellaneous	32	15	.087	.055	14	12	.332	.326	46	27	.112	.088
Stripping or open-cut	16	6	.044	.022	5	8	.119	.217	21	14	.051	.046
Surface	53	20	.144	.074	16	8	.380	.217	69	28	.168	.091
Total	1,024	664	2.781	2.456	186	185	4.416	5.019	1,210	849	2.949	2.763

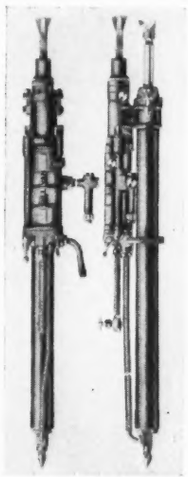
*All figures subject to revision.

WHAT'S NEW

In Coal-Mining Equipment

STOPER

Sullivan Machinery Co., Michigan City, Ind., offers the new "Safe-T-Stoper," which it describes as the only self-supporting stoper available. A second major feature is a new valve action. The self-supporting feature of the machine, it is pointed out, takes the risk out of stoping, as the machine is held firmly in place at all times, and even if the air should fail, it will stand by itself for at least 30 minutes, it is asserted. At least 25 per cent more footage can be obtained with the "Safe-T-Stoper," the manufacturer contends, through greater ease in handling. Lower repair cost is another major claim.

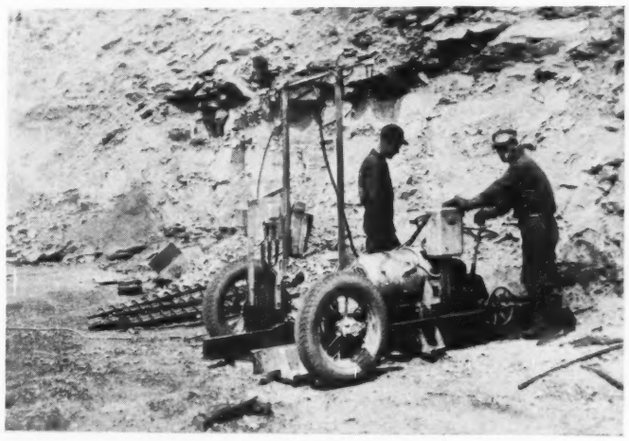


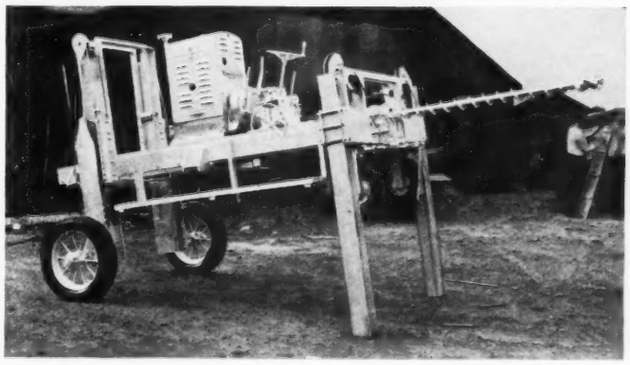
SIDEWALL DRILLS

Paris Mfg. Co., Paris, Ill., offers, in addition to "Senior" and "Super-Senior" horizontal drills for strip-pit work, a new angle-drilling machine for drilling holes either horizontally or at any desired upward angle in "double-decking" of holes for breaking up overburden. The "Parmanco Senior" drill, weighing 1,300 lb., is powered by a 16-hp. 4-cylinder air-cooled Wisconsin engine giving a drilling speed of 165 r.p.m., variable 20 per cent both above and below. Weight is 1,300 lb. and the machine is built to take auger lengths from 3 ft. 4 in. to 6 ft., and to drill holes from 4 to 6¼ in. in diameter 50 ft. or more in depth.

Also powered by a 16-hp. Wisconsin engine, the Super-Senior drill can be operated at either 165 r.p.m. or 80 r.p.m. An electric motor may be used instead of the gasoline engine, and for special work a two-speed electric motor can be supplied. Weight of the drill is 1,700 lb. in the gasoline model and 2,000 lb. in the electric model (illustrated herewith). According to the company, it will handle auger lengths up to 9 ft. and has drilled holes as large as 14 in. 50 to 60 ft. deep beneath pavements and railroads for pipeline work. In addition to the above models, a "Parmanco Junior" unit is available for general-utility and light-service applications.

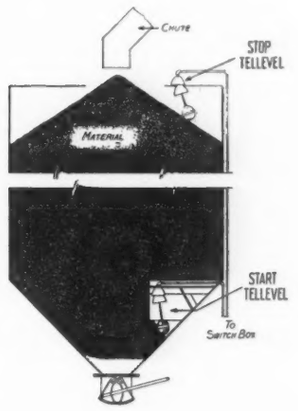
The new angle machine for either horizontal or angle holes (illustrated herewith) is provided with the necessary adjusting mechanism for drilling either straight in or on an upward angle, the adjustments also providing for varying the height at which the hole is started above the coal.





BIN-LEVEL CONTROLLER

For controlling automatically the level of material in any bin, Stephens-Adamson Mfg. Co., Aurora, Ill., offers the "Televel" automatic storage control, which it describes as an extremely sensitive inexpensive device with no wearing parts. Control of the material level in bins is accomplished by the Televel starting and stopping conveyors or elevators. Normally, operation is entirely automatic, but by a simple change in wiring, according to the company, the Televel can be made to keep the flow of material stopped or continuous until the control switch is thrown. The control consists of three mercury switches in series with a sensitive cast-aluminum housing containing a downward-hanging Bakelite sphere. The housing is suspended from above by a conduit which permits the Televel to swing freely as the Bakelite sphere is moved by the material. In addition to bulk materials, the equipment may be used also for controlling liquid levels.



Stephens-Adamson also offers a complete new line of "Sealmaster" ball-bearing pillow blocks featured by a permanent sealing system within the bearing itself, so that it may even be removed from the shaft without the possibility of the entrance of dirt. Prelubrication and self-alignment are other bearing features. The pillow blocks consist of rigid one-piece castings, with spot-cored boltholes and "Alemite" hydraulic fittings.

A new line of "Saco" constant-speed speed reducers is another Stephens-Adamson development. These reducers, according to the company, can be used with any standard full-speed motor, and the motor support is adjustable for a V-belt drive, permitting sheaves to be replaced with ease for changes in output speed. The shaft-support construction of

the reducers, it is stated, permits a heavy overhung load. Output speeds range from 13.2 to 172 r.p.m.; efficiency runs from 89 to 93 per cent.

FIRE-FIGHTING AIDS

Cardox Corporation, Chicago, offers new fire-fighting methods and equipment employing carbon dioxide for preventing or extinguishing fires. This extension of Cardox services is made possible by the development of a new method of storing and transporting carbon dioxide in liquid form at a very low temperature and in unlimited bulk quantities.

Cardox fire-fighting systems, according to the company, are available in several forms: (1) fixed systems, completely automatic in operation; (2) built-in systems, manually controlled; (3) mobile equipment; and (4) hand-type portable extinguishers for incipient fires.

Fixed installations — either automatic or manual controls —can be based on the storage of carbon dioxide in quantities of 2 to 30 tons. The latter sized storage unit, according to the company, is capable of rendering the atmosphere in 1,000,000 cu.ft. of space inert. For total flooding systems, as much as 8,000 c.f.m. can be released from a single outlet.

Truck equipment, such as that illustrated, is used for replenishing the carbon-dioxide supply. Truck-mounted tanks holding from 1 to 8 tons of carbon dioxide may be used as mobile units for fighting fires wherever they occur.

For incipient fires, Cardox offers various types of portable carbon-dioxide extinguishers in capacities of 50, 10 and 2½ lb. The 10-lb. unit is illustrated. Typical applications include small underground mine fires, all forms of electrical fires, inflammble liquids, papers and documents, etc.

TROLLEY GUARD

A new rubber trolley guard especially developed for mine service and said to eliminate the objections encountered with other types of guards is offered by the B. F. Goodrich Rubber Co., Akron, Ohio. This

guard is made of cloth-inserted sheet rubber 3/32 in. thick and 9 in. wide, which is folded double and cured in a permanent U shape. The material flexes or bends in either direction to provide protection from all sides. The trolley wheel also slips through without resistance. Installation is accomplished by notching the material to fit around the hanger and placing it over the wire like a saddle. Installed cost, according to the company, compares favorably with wood guards. It is supplied in 50-ft. lengths, lasts longer and requires little maintenance.

DUST COLLECTION

Sturtevant Mill Co., Dorchester, Boston, Mass., offers the new Sturtevant "Hydroclone" system of dust and fume suppression. The Hydroclone unit separates the dust from the air by a combination of centrifugal force and wet impingement and washing. The dust is precipitated in the form of sludge in a dewatering tank which is part of the system. The water is recirculated, and the Hydro-clone, according to the company, will not freeze in operation in cold weather. If dry dust collection is desired, it is separated in a "Dry-clone" connected with the Hydro-clone, with the latter collecting the fine nuisance dust as sludge. The Hydroclone is said to be devoid of all moving parts or spray nozzles.

DRAGLINE BOOM

A special 100-ft. aluminum boom for use on the standard P&H Model 955-LC dragline (normally equipped with an 80-ft. boom for 2½-cu.yd. bucket) has been developed by the Harnischfeger Corporation, Milwaukee, Wis. This new boom, according to the company, permits the use of a 1½-yd. bucket for large-scale dirt moving. A stiff-leg gantry is said to be a major factor in keeping the weight of the boom within the allowable maximum and practically eliminating bending. The construction also is stated to reduce compression stresses and permit a much higher slenderness ratio—resulting in a favorable angle between the boom topping line and the boom in all positions.

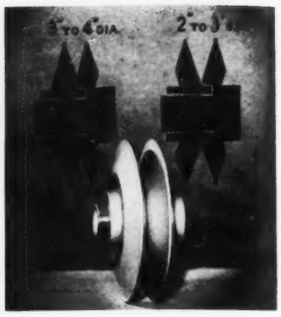
FLUORESCENT LAMP

A new light source for general industrial use—a 100-watt fluorescent lamp—is announced by the General Electric Vapor Lamp Co., Hoboken, N. J. The new lamp is a tubular light source 4 ft. in effective length and the rated life, it is stated, will compare favorably with that of other industrial light sources. A major feature of the new lamp resulting from the phenomenon of fluorescence is its high efficiency. In con-

trast with the 100-watt bulb-type mercury lamp with an initial efficiency of 35 lumens per watt, or more than twice that of an equal-wattage incandescent lamp, for example, the efficiency of the 100-watt fluorescent lamp is 50 lumens per watt.

ADJUSTABLE SHEAVE

Allis-Chalmers Mfg. Co., Texrope Division, Milwaukee, Wis., offers a new adjustable "Texsteel" sheave, which it describes as a combination sheave for double duty. With the outer plate in position as at the left in the illustration, the Texrope



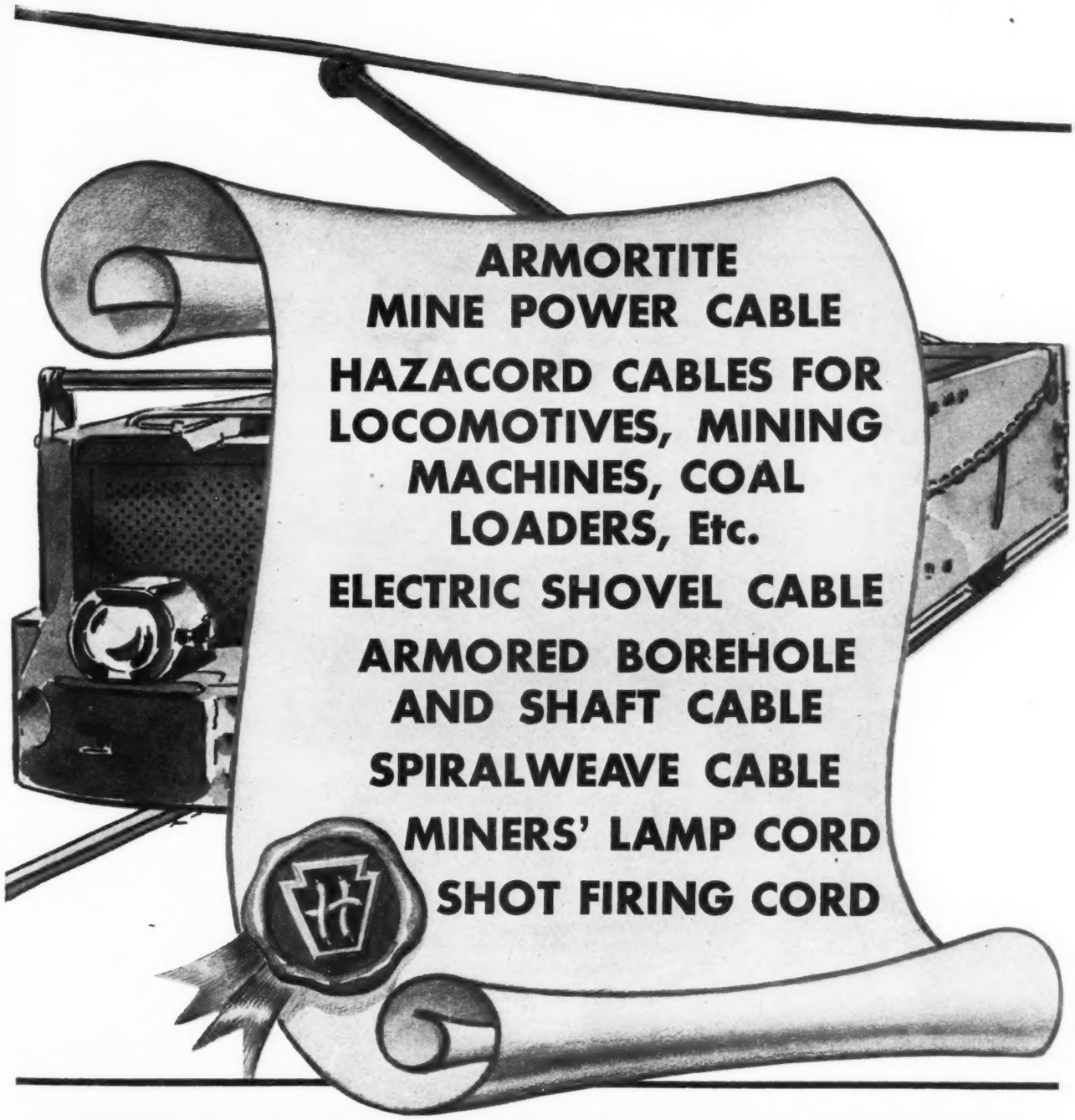
belts ride high and give a pitch diameter anywhere from 3 to 4 in. With the outer plate reversed, pitch diameter is from 2 to 3 in. The change, according to the company, takes but a moment.

NEW WELDERS; ELECTRODE

A new line of "Shield-Arc" welders, said to provide greater convenience and accuracy as a result of a new self-indicating dual continuous control, is announced by the Lincoln Electric Co., Cleveland, Ohio. These welders have both the job-selector and current controls calibrated and equipped with dials which indicate the type of work and the number of amperes for each and every setting, it is stated. This development, it is asserted, enables the operator to secure the highest quality welds and highest possible speeds because he can vary both the slope of the volt-ampere curve and the amount of the welding current independently and positively to suit every job.

Another feature of this control cited by the maker is that both voltage control (job selector) and current control are continuous in operation, thus providing thousands of possible voltage and current combinations, simplifying the setting of the control and providing an exceptionally wide welding range as to types of work, welding conditions, sizes of electrodes and thicknesses of material. Being continuous, the control can be advanced or retarded in increments as small

HAZARD WIRES AND CABLES FOR COAL MINES



ARMORTITE MINE POWER CABLE

HAZACORD CABLES FOR LOCOMOTIVES, MINING MACHINES, COAL LOADERS, Etc.

ELECTRIC SHOVEL CABLE

ARMORED BOREHOLE AND SHAFT CABLE

SPIRALWEAVE CABLE

MINERS' LAMP CORD

SHOT FIRING CORD

HAZARD INSULATED WIRE WORKS

DIVISION OF THE OKONITE CO.

WORKS: WILKES-BARRE, PENNSYLVANIA

New York Chicago Philadelphia Atlanta Pittsburgh Buffalo Boston Detroit
Seattle Dallas Washington San Francisco St. Louis Los Angeles

as desired. The new welders are available in all standard ratings in both a.c. and d.c. motor types, belted or coupled, as well as in gasoline- or diesel-engine types.

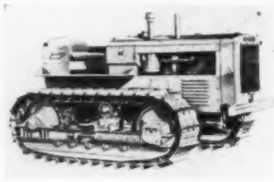
Lincoln Electric Co. also offers "Softweld," a heavily coated "shielded-arc" electrode designed for depositing a soft machinable alloy on cast iron. It is recommended by the company for correcting machining errors, filling up defects and producing a very soft machinable and drillable weld in gray cast iron. The electrode size (polished at end) is 5/32x16 in.

BATTERY POUCH

American Brattice Cloth Corporation, Warsaw, Ind., now offers Watkins safety battery pouch made of the same material as is used in "Mine-Vent" flexible blower pipe. The pouch fits all standard lamp batteries and is very light in weight, the company states. It can be attached to the belt or slipped into the pocket. Other features noted by the company include: sponge-rubber back pads to prevent chafing and sweating under the pouch; acidproof rubber-coated fabric—tough and long-wearing; saving of clothing and battery; and preventive of "battery sores."

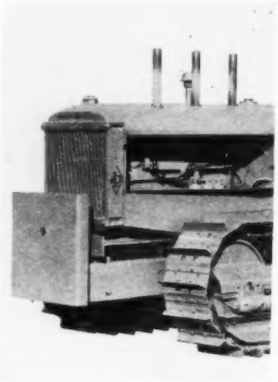
GASOLINE TRACTOR; PUSHER BUMPER

A new gasoline tractor (Model "S") is announced by the Allis-Chalmers Mfg. Co., Milwaukee, Wis. This new machine is said to be the same in appearance and performance as the Model "S-O" controlled-ignition oil tractor already offered by the company. The



Model "S" develops 77.66 hp. on the belt, 64.52 hp. at the drawbar, and a 16,732-lb. drawbar pull in first gear. Five forward speeds of 1.52 to 6.37 m.p.h. are available, along with 62-in. (shipping weight, 18,200 lb.) and 74-in. (19,000 lb.) tread widths. Fuel consumption is stated to be only 0.5 lb. per brake horsepower hour, continuous service, 80 to 90 per cent full load. The new unit is said to be especially suited to use with snowplows, 7- to 8-cu.yd. scrapers, 12-ft.-blade graders, 10-cu.yd. wagons; bulldozers, etc.

Allis-Chalmers also offers a front-end bumper for its Model "L-O" tractors for use in pushing scraper outfits while loading. Time studies, according to the company, show that payloads are increased 2 and 3 cu.yd. per trip. Repair costs may



be cut by relieving the pulling tractors of the twisting and jerking strains customary to loading. One pusher tractor can handle three to five tractor-scraper units, depending upon the haul, and also is available for emergency uses, thus making it unnecessary to take a tractor out of pay service. The pusher also reduces operator fatigue and consequently increases production, according to the company, by cutting the amount of gear-shifting and steering-clutch work otherwise necessary in scraper loading.

SCRAPER

A new and larger "Carryall" scraper, the "RU," with a heaped capacity of 30 cu.yd. and a struck capacity of 22.2 cu.yd., is announced by R. G. LeTourneau, Inc., Peoria, Ill. According to the company, tractor effort is reduced and payloads are increased by the LeTourneau sliding bucket, and this feature, combined with the use of a pusher (usually necessary with scrapers over 15 cu.yd. in capacity) and a special cutting blade, has shortened loading time and distance. Fractional-inch cutting and controlled spreading are secured through the cable action of the power-control unit. In dumping, loads can be spread to a measured depth of 24 in. Draft has been reduced by placing two large 24x32 tires 80 in. high on the rear.

WELDING EQUIPMENT; HOIST MOTORS

For welding mild-steel and other readily welded metals, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., offers a new "Weld-o-Trol" electronic power switch for controlling the primary of welding transformers. The control is suitable, according to the company, for use with existing timing devices. Available ratings are roughly equivalent to those of the conventional 300- and 600-amp. contactors. The new control is said to offer an instantaneous power switch for producing uniform welds and to be free of moving parts, arcing contacts and noise. The only electrical connections required are one power cable entering and another leaving the unit. No added control voltage is necessary.

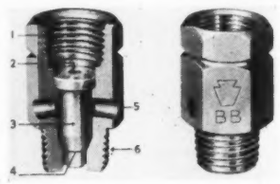
A new "Flexarc" welding cable, said to be flexible, durable, light and made with positive insulation, is another Westinghouse offering for field and shop use. This cable complies with the latest I.P.C.E.A. specifications for rubber-sheated arc-welding cables. The paper separator between the copper and rubber sheathing, according to the company, permits sliding action between the outside layer of wires and the rubber jacket. Also, the large number of fine copper wires composing the stranding provide extreme flexibility. Jackets are of 60-per-cent rubber armor.

Type CS hoist motors designed for severe intermittent service where frequent starts, stops and reversals are encountered, such as in car spotters, are another Westinghouse development. According to the company, the high-resistance rotor provides the highest ratio of starting torque to starting current available in a squirrel-cage motor. Line disturbance is reduced to a minimum and low-cost full-voltage starters may be used in the majority of installations. Light loads are handled quickly, while heavier loads cause the speed to decrease with corresponding increase in torque.

To counteract and practically eliminate galvanic action in, or electrolysis of, underground pipe lines, Westinghouse has developed a copper-oxide "Rectox" rectifier for cathodic protection. Ratings range from 3 to 50 volts, 1 to 125 amp., d.c. output. The rectifiers consist of the necessary Rectox units together with a two-winding transformer, disconnect switch and terminal board, all mounted in a sheet-metal cabinet designed either for outdoor or indoor use.

LUBRICATION CONTROL

Keystone Lubricating Co., Philadelphia, Pa., offers the Keystone BB fitting for use at the bearing in connection with present grease-cup or high-pressure fittings. The company declares that the new fitting renders it virtually impossible to overload anti-friction bearings through high-pressure lubricant application. The



maximum pressure under the control exercised by the fitting is stated to be 2½ oz. per square inch on the bearing proper, thus making it impossible to overload and force grease from the bearing housing into the motor windings or other adjacent parts. The fitting will operate over a wide range of lubricant densities, and with modifications it is adaptable to special applications where the fitting must be located some distance from the bearing.

ELECTRODE

An addition to its line of "Murex" heavy-coated electrodes for manual arc-welding is announced by the Metal & Thermit Corporation, New York City. The new electrode, designated "Murex Fillex," is designed for fillet welding and other downhand work. Welds made with this electrode, according to the company, meet the American Welding Society's specifications for Grade 10 filler metal. The outstanding feture, it is asserted, is the low cost of deposited metal. Used at unusually high amperages, "Fillex" will not undercut and is said to permit an appreciable increase in output.

COAL AGE

A McGRAW-HILL PUBLICATION

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FEBRUARY 1939

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- **Keeping track** of supplies at a 5,000-ton mechanized operation might seem a formidable task at first glance. But at the Kathleen mine in Illinois, two men keep all the records, including a perpetual inventory. This storekeeping system, to be described in an early issue, provides for charging parts or materials directly to machines, sections, etc., and for daily reports for operating management.

- **Major problems** facing the industry in 1939, as viewed by coal-company presidents from all parts of the country, are set forth in the symposium starting on page 29. As might be expected, price fixing and the Guffey law are very much in the spotlight. This cross-section of executive thinking reveals some wide splits in opinion expressed in no uncertain terms.

- **With** an average daily output of 485 tons, the Fort Hartford Coal Co. has a connected electrical load totaling 155½ hp. This entire load is handled by a diesel-powered 60-kw. d.c. generator. Power unit and auxiliaries cost $5,745; fuel-oil cost is 0.6c per kilowatt-hour. How Fort Hartford conducts its operations to make these results possible will be told in March Coal Age.

- **Doubting Thomases** should avoid the two stories on mechanical loading in this issue like the plague. Bituminous output took a nose dive last year, but the percentage of coal mechanically loaded jumped 25 per cent. And mechanical loading was introduced in an increasing number of mines. As a result, total unit equipment sales were only slightly under 1937. See pages 50 and 56.

- **Faced with** the necessity of finding new uses for the thousands of tons of sludge from its cleaning plants, Pittsburgh Coal turned to a study of low-temperature distillation. "Disco," a solid, smokeless fuel, was born. Carl Lesher and R. E. Zimmerman will trace the story of this development from its inception in 1928 in March Coal Age.

- **Mine illumination** has made great strides in both safety and efficiency since the days of the rushlight. But we are still far from exhausting the possibilities of research and improvement, declares Carl Egeler, lighting specialist, who discusses lighting trends in the article on page 69. Particularly, he points out, is there need for further progress in underground illumination, where the problem admittedly is difficult.

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Volume 44 No. 2

TWENTY-EIGHTH ANNUAL REVIEW AND PROGRESS NUMBER

Good lighting promotes safety and efficiency: see p. 69

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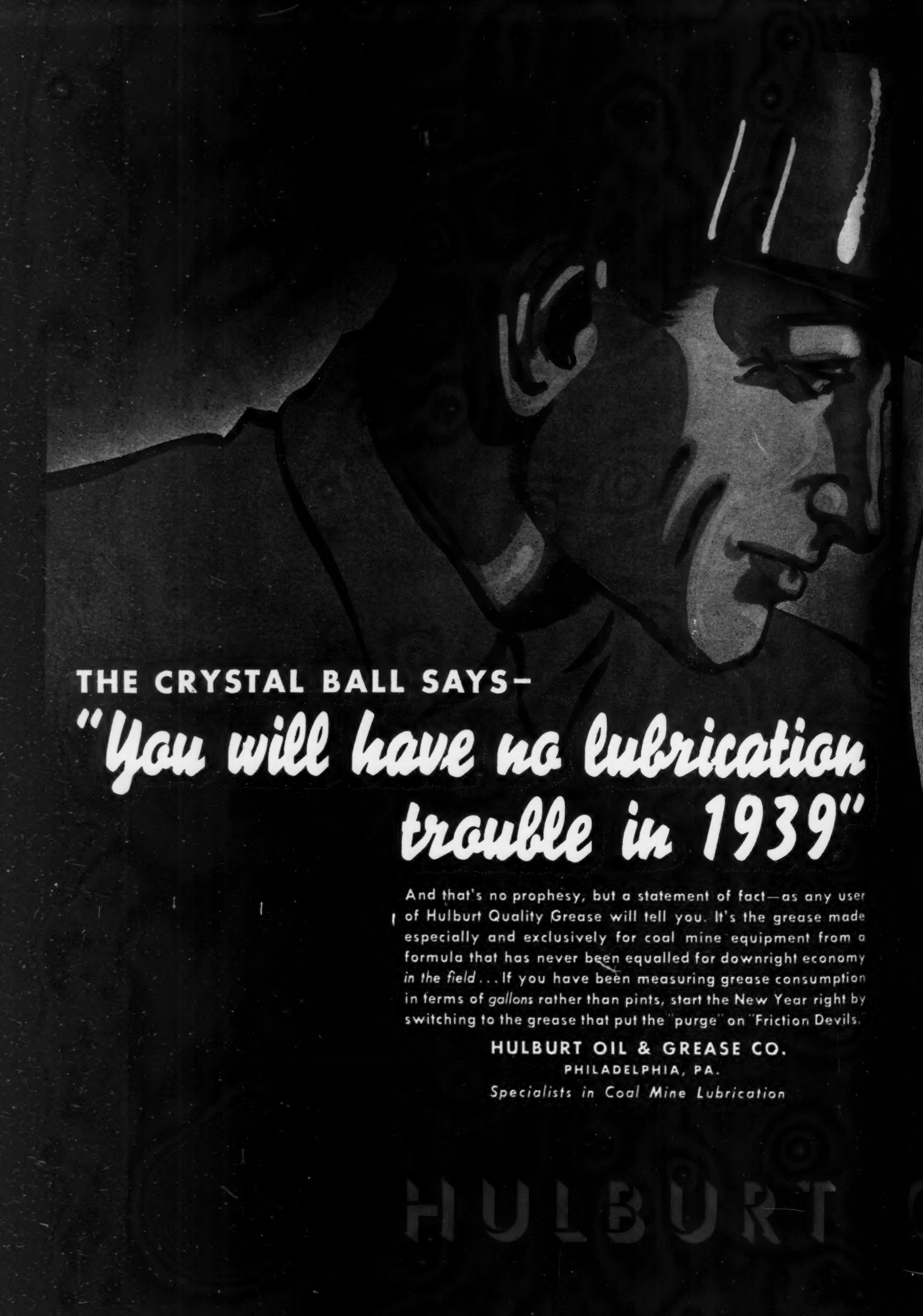
THE CRYSTAL BALL SAYS–
"You will have no lubrication trouble in 1939"
And that's no prophesy, but a statement of fact—as any user of Hulburt Quality Grease will tell you. It's the grease made especially and exclusively for coal mine equipment from a formula that has never been equalled for downright economy *in the field*... If you have been measuring grease consumption in terms of *gallons* rather than pints, start the New Year right by switching to the grease that put the "purge" on "Friction Devils."
HULBURT OIL & GREASE CO.
PHILADELPHIA, PA.
Specialists in Coal Mine Lubrication
HULBURT


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QUALITY GREASE
QUALITY GREASE

100 Mine Cars Worth $798,000!

These mine cars hold four tons of coal each. How can 100 of them be worth $798,000.00? *What's the joke?*

It's far from being a joke. **If you read our message to the end you will doubtless agree that it's serious, important business.**

EXPLANATION

The cars are S-D Automatics. The estimates of what they are worth to coal operators not using them now is based upon figures of coal operators using them in Pennsylvania, Alabama, Kentucky, and Tennessee. These practical men once used end dump and rotary dump mine cars. They replaced these old-fashioned designs with S-D Automatics. Then they gave us their figures as to the savings *actually made*. The worth of the cars has been calculated from these records of what has actually *happened*.

HERE'S THE CALCULATION

The coal operators proved a saving (shown on their record books) by using S-D Automatics which ran from 20c to 57½c a ton of coal handled—an average of more than 32c a ton. (This saving, by the way, does not include the value of the much larger percentage of lump from the S-D Automatics.)

If each car makes 600 trips a year, it will haul 2400 tons of coal a year, on which tonnage $768.00 will be saved, on the basis of 32c a ton. If each car lasts only 10 years—and S-D Automatics, being ruggedly built, and never being turned over or wracked, last much longer than this—it will save during its life $7,680.00. Thus, 100 cars in 10 years will save $768,000.00. Outside the savings the cars will be worth their cost of about $30,000.00, making the total worth of the 100 cars $798,000.00.

SUMMARY

This sounds crazy, doesn't it? Yet we are merely giving you figures which practical coal operators have given us, men who have been paying *big dividends* for years out of their extra savings from S-D Automatics. These almost unbelievable figures of profits to be made must be approximately correct.

The fact is that many, many coal companies have been scrapping end dump and rotary mine cars ruthlessly, and installing S-D Automatics in place of them. (one company has changed 6 mines. Think of this!) Also many, many new mines have installed S-D Automatics to begin with. Everyone is pleased to death. Our latest 1-2-3 Automatic is in a class by itself for saving coal breakage, for large capacity, and for durability.

HERE'S THE ALL-IMPORTANT QUESTION

Are you, Mr. Reader, sufficiently interested to investigate this matter further? Please let us joyfully give you an estimate now of what you can expect to do. We will engineer your proposition scientifically. We will even try to make you a proposition—if you want it—by which the S-D Automatics will more than pay for themselves before you have finished paying us for them. Did you know that we lease S-D Automatics —repair costs on us?

If you will just send us a blue print of your present mine car, you will have taken the first big step towards saving hundreds of thousands of dollars for your company. Won't you do that much right away? Please do, and then we will get busy with figures.

SANFORD-DAY IRON WORKS, INC., Knoxville, Tenn., U. S. A.

Mine Cars, All Types - Trailers - Sheaves - Wheels

Little more than a penny per shift! That was the actual cost record of this long-lived O-B Heavy-Duty Trolley Shoe under gruelling main haulage service conditions in one Ohio mine! Mighty economical current collection under any condition, it's typical of O-B Wheel and Shoe performance.

Varying haulage conditions, current conditions and wire conditions make the life of a current collector an uncertain thing at best. But you can always be sure of one thing! —The correct design and manufacturing uniformity of O-B current collection equipment will give you the best results under any set of conditions! O-B Locomotive Equipment gets the most out of your motor!

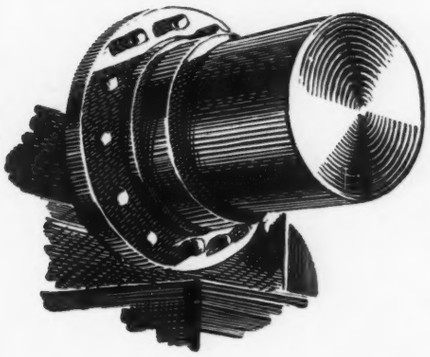
OHIO (B) BRASS

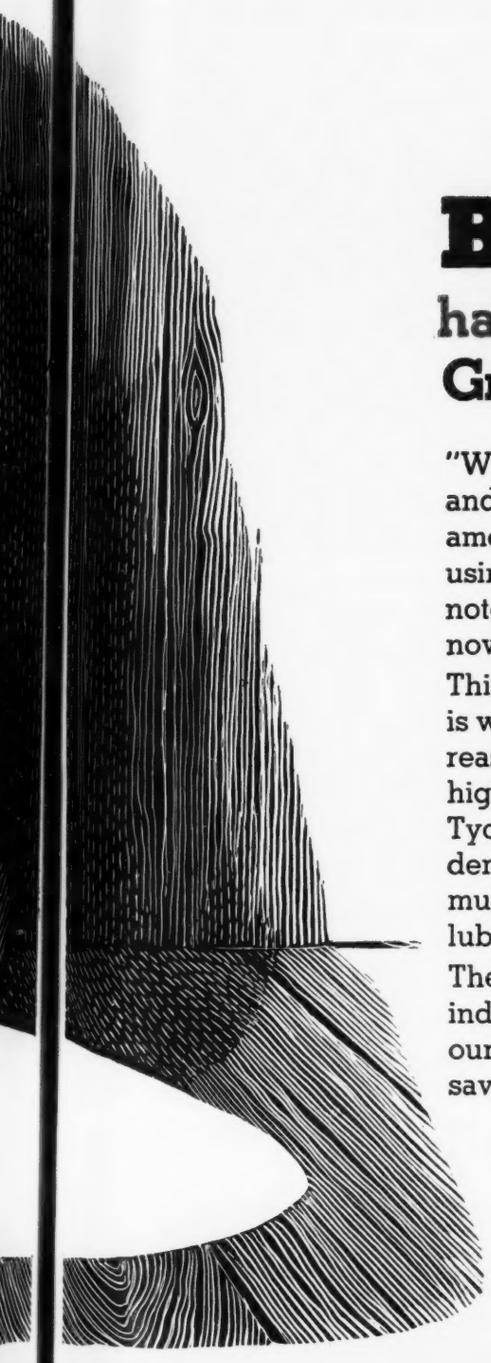
MANSFIELD OHIO · U · S · A

Canadian Ohio Brass Company, Ltd • Niagara Falls, Ont., Canada

2069-M


WASTE
shows up quickly
HERE...
TYCOL
OILS-GREASES
TIDE WATER
THERE IS A COMPLETE LINE OF TYCOL LUBRICANTS





BUT IN BEARINGS

half the grease oozed away until Tycol Green Cast Greases revealed the losses

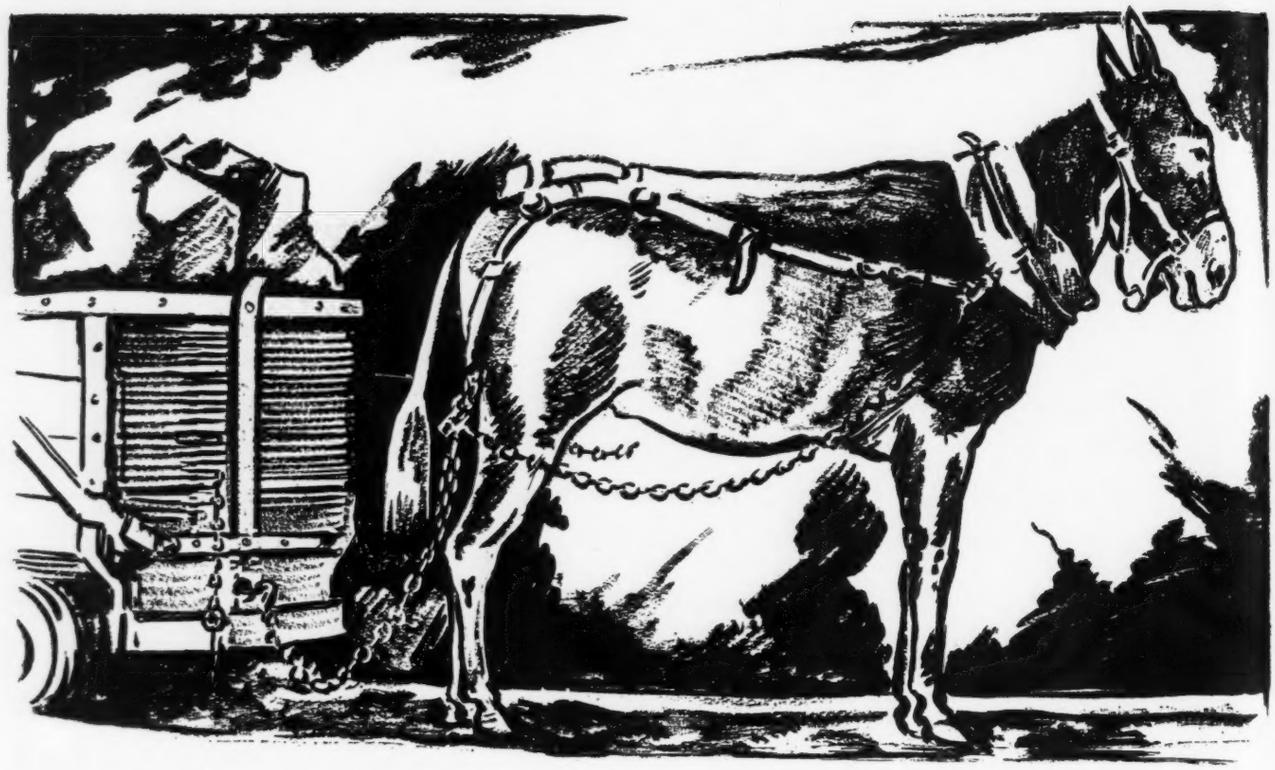
"We felt that the lubrication job was not being well done. Pressures and temperatures seemed too high for the grease we were using. The amount used, too, was apparently excessive. Since we have been using Tide Water Greases there are differences that are readily noted. We were formerly compelled to pack the bearings twice a day; now we get along with one filling a day."

This plant also enjoys a feeling of confidence that the lubrication job is well done. Maintenance and replacement have been lowered. The reasons are easily understood: Ordinary greases formerly used were high in soap – soap necessary to give "body" to light bodied oils. Tycol Green Cast Greases are compounded of paraffine-base cylinder oils . . . oils that make possible a full-bodied grease with a minimum of soap. The more oil per pound of grease the greater the lubricating value of the grease.

There is a Tycol Grease and Oil scientifically engineered to fit each industrial requirement. Drop us a line. We will be glad to send one of our engineering staff to show you how "engineered lubrication" can save you money and worry.

TIDE WATER ASSOCIATED OIL COMPANY
TIDE WATER DIVISION, 17 BATTERY PLACE
New York, N. Y.

GREEN CAST GREASES
SCIENTIFICALLY ENGINEERED FOR EVERY INDUSTRIAL USE



REMEMBER THE MULE?

● When you need new equipment or replacements, remember the mule! Back in the wireless days of coal mining he plugged along day after day, required little attention, and gave years of trouble-free service for pennies per ton . . . and that's just what you've got to look for in many of the things you use today.

Remember the mule's endurance and dependability when you buy cable for the internal wiring of your locomotives and mining machines, and make sure you get one that will stubbornly resist failure-causes. You need a cable that can take heat and overloads without becoming brittle or cracking . . . a cable that oil or grease can't swell or rot . . . a cable that's absolutely fireproof because it is insulated with asbestos . . . and you'll get it if you specify ROCKBESTOS A.V.C. MINING CABLE on your requisitions and purchase orders.

If you haven't standardized on Rockbestos A.V.C. Mining Cable for rewiring place a trial order with your nearest jobber. Install it and check its service record against the wire you are now using for convincing proof that it lasts longer, reduces maintenance expense and costs less per ton mined. For samples and literature write: Rockbestos Products Corporation, New Haven, Conn.

Also refer to McGraw-Hill Coal Mining Catalog

ROCKBESTOS A.V.C. MINING CABLE JOBBERS

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BIRMINGHAM, ALA.: Moore-Handley Hdwe. Co.
BLUEFIELD, W. VA.: National Elec. Coil Co.
Superior-Sterling Co.
CLEVELAND, OHIO: Upson-Walton Co.
COLUMBUS, OHIO: National Elec. Coil Co.
EVANSVILLE, IND.: Evansville Elec. & Mfg. Co.
FAIRMONT, W. VA.: Fairmont Supply Co.
HUNTINGTON, W. VA.: Banks-Miller Supply Co.
LOTHAIR, KY.: Mine Service Co.
MIDDLESBORO, KY.: Rogan & Rogan Co.
PITTSBURGH, PA.: Upson-Walton Co.
Iron City Elec. Co.
SCRANTON, PA.: Penn Elec. Engineering Co.
WILLIAMSON, W. VA.: Williamson Supply Co.

ROCKBESTOS DISTRICT OFFICES

NEW YORK: 5942 Grand Central Terminal
BUFFALO: 487 Ellicott Sq. Bldg.
PITTSBURGH: 2137 Koppers Bldg.
CLEVELAND: 1675 Union Commerce Bldg.
DETROIT: 612 Stephenson Bldg.
CHICAGO: 847 Marquette Bldg.
ST. LOUIS: 2125 Railway Exchange Bldg.
LOS ANGELES: 320 East Third St.
SAN FRANCISCO: 367 Ninth St.
SEATTLE: 1714 First Avenue So.
PORTLAND, ORE.: 209 S.W. First Ave.

In CANADA—Phillips Electrical Works, Ltd., Montreal, Que., and Brockville, Ont.

In ENGLAND—British Insulated Cables, Ltd., Prescot, Lancashire

STRENGTH · ELASTICITY · FLEXIBILITY · TOUGHNESS · DURABILITY

Determination is Still the Driving Force to Achievement

"Suddenly Galileo dropped the two shots of different weights and" . . . his idea, the daily used law of falling bodies, had been proved. Galileo's will to achieve had again won out.

The WILL to produce

"HERCULES" (Red Strand) Wire Rope is the result of our long and steadfast determination to produce a product of the very highest quality. That was one of the original Leschen principles, and today—throughout our entire organization—there is keen satisfaction . . . sincere pride . . . in being able to bring to you a wire rope made according to this pattern.

Your experience in using "HERCULES" will prove that we are justified in this pride . . . because its performance is proof of its superior quality . . . the result of our determination to make it so.

In order to be suitable for all mining purposes, "HERCULES" (Red-Strand) is made in a wide range of both Round Strand and Flattened Strand constructions—all of which can be furnished in either the Standard or Preformed type.

"HERCULES" REG. U.S. PAT. OFF. RED-STRAND WIRE ROPE

MADE ONLY BY

A. LESCHEN & SONS ROPE CO.

WIRE ROPE MAKERS • ESTABLISHED 1857

5909 KENNERLY AVENUE • • ST. LOUIS, MO.

New York	90 West Street	San Francisco	520 Fourth Street
Chicago	810 W. Washington Blvd.	Portland	914 N. W. 14th Avenue
Denver	1554 Wazee Street	Seattle	3410 First Avenue South

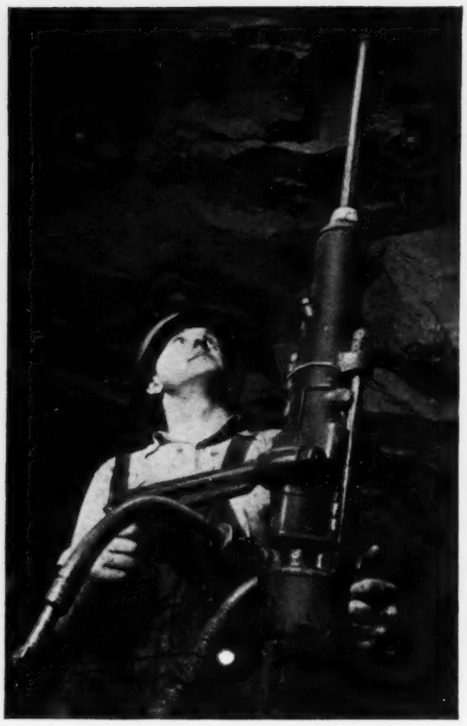
A February Check List

Manganese steel cures frog troubles

A HIGHLY valuable property of manganese steel is this: the more it is hammered or rolled, the harder it gets. This is a pronounced advantage in frogs.

Frogs built of manganese steel will become harder in service and after a few weeks will be considerably harder than rail steel. In fact, records show that initial use of a Bethlehem solid manganese-steel frog will increase its hardness by approximately 150 points Brinell without affecting its original toughness.

Bethlehem makes two designs of solid manganese-steel frogs: Design 289, nonguarding; and Design 290, self-guarding. Both are of one-piece construction, and require no splice bars. Integrally cast webs give ample reinforcement to the underside. When properly installed, breakage is rare. The common experience is that one Bethlehem solid manganese-steel frog will outwear several riveted plate frogs.

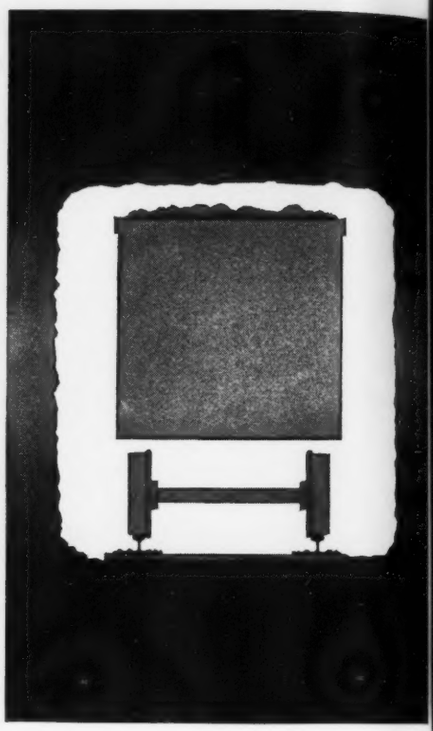


Here's your steel for rock drilling

BETHLEHEM Superior Hollow Drill Steel has proved itself on quality. It is extensively used in metal mines, quarries, and construction work where rock drilling is a major problem. Bethlehem Superior is, moreover, an ideal steel for development work in coal mines.

The material is rolled under special temperature control, which produces a structure suitable for severe operating conditions. It is resistant to fatigue. It holds its edge remarkably well. Of particular, practical importance is the round, smooth and well-centered hole. Blacksmiths comment favorably on the workability of the steel; it can be forged without difficulty.

Bethlehem Superior Hollow Drill Steel finds extensive use in the mining industry, both as conventional forged drill steel and as fabricated drill rods, which are used in connection with detachable bits.



If overhead clearance is important

BETHLEHEM Steel Mine Ties make possible track that is several inches lower than when the rails are laid on wood ties. The heaviest Bethlehem Steel Tie is only slightly over one inch high; the No. 3 tie, good for rails up to 40-lb., is $\frac{13}{16}$ in. high. This saving in height means money saved in driving tunnels; it means increased loading of cars in rooms or blocks.

Bethlehem Ties have other advantages. Because rolled-steel clips anchor the rails to each tie, there are no spikes to drive, rails are held more securely, and are kept accurately to gage. Track can be laid or removed in about half the time otherwise needed. Because ties do not become spike-cut, they can usually be used 20 to 30 times without loss of holding power.

Experience has proved that where track is frequently relaid, or where overhead clearance is important, Bethlehem Steel Mine Ties very soon pay for themselves.

Other Bethlehem Products for the Coal Industry: Rails... Switches, Switch Stands, Turnouts and Special Trackwork... Track Bolts, Nuts and Spikes... Mine Cars... Wheels and Axles... Structural Shapes and Steel Timbering... Plates... Fabricated Steel Construction... Carbon and Alloy Steel Bars... Forgings... Castings... Pipe... Piling... Wire, Nails, Fence and other Wire Products... Pig Iron.

BETHLEHEM STEEL

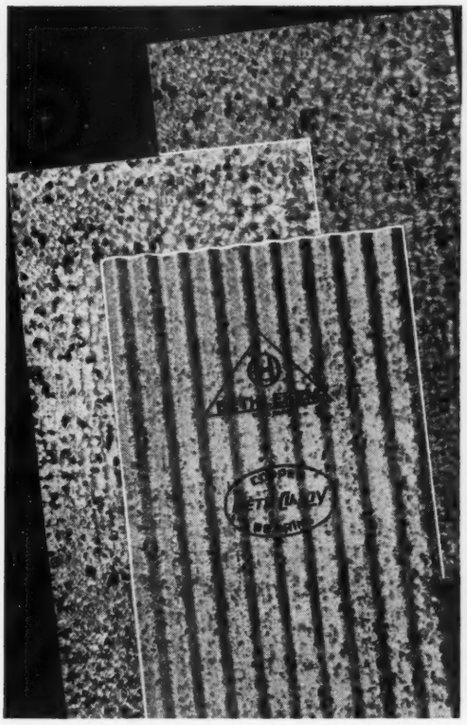
to Help the Profit Sheet

Running ropes should be Form-Set

WHETHER it's a hoist rope on a shovel or a feed rope on a cutting machine, running ropes should be Bethlehem Form-Set. This type of pre-formed wire-rope construction, whereby each individual strand is shaped to fit the rope, rather than held in place under tension, greatly increases the life of a rope.

When the rope is relaxed, the strands are relaxed. When the rope comes under tension, each strand is under balanced load, and in proper position to do its full share of the work. Even on a worn rope, there is little or no wickering—evidence of how well the wires tend to keep in their proper position.

Bethlehem Form-Set gives extra value that much more than offsets its higher initial cost. Wherever ropes are subject to fatigue or may be discarded because wickering makes them dangerous to handle, Bethlehem Form-Set is the logical rope.

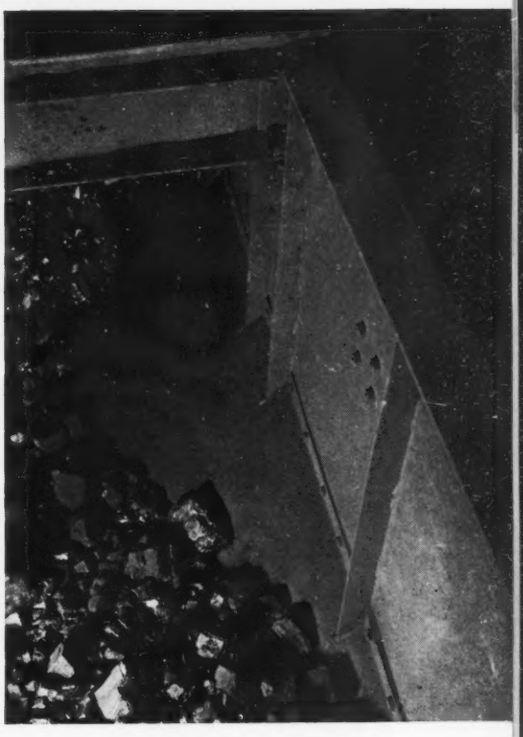


Double value in Beth-Cu-Loy Sheets

BETH-CU-LOY is the trade-mark to look for when you want extra life, extra protection against atmospheric corrosion, in steel sheets.

Beth-Cu-Loy is true copper-bearing steel, containing just the right amount of copper to provide maximum resistance to rust. In other respects, Beth-Cu-Loy sheets are the same as those made of high-grade open-hearth steel. Just as soft, just as ductile, just as strong, and just as easy to form. Beth-Cu-Loy Sheets are available as flat galvanized sheets, or as formed roofing and siding sheets. They are also available as hot-rolled, hot-rolled-annealed or cold-rolled sheets.

Tests and installations have definitely shown that Beth-Cu-Loy has from two to two and one-half times the resistance of ordinary steel to atmopheric corrosion. Yet the cost of Beth-Cu-Loy Sheets is only a trifle more—averages under 5 per cent.



Extra life where there is abrasion

HERE are steel plates that have from two to ten times the life of mild carbon-steel plates when subjected to abrasive action.

In fact, some users of Bethlehem Abrasive-Resisting Steel Plates report increased life as compared with alloy steels costing four to eight times as much.

These steel plates are ideal for chutes, screens, hoppers, conveyor bottoms and other mine applications involving abrasion. Made in two grades: No. 235 and No. 300—the grade number indicating the approximate Brinell hardness of plates. The latter is, of course, the harder grade, but is somewhat less ductile than No. 235.

A test installation using both of these grades will show you which is best for your conditions—or a Bethlehem engineer will be glad to look over any proposed installation and make recommendations.

BETHLEHEM STEEL COMPANY

TIREX Cords mean mine safety

Mine safety is a broad subject, much more so than is generally understood. Simplex-TIREX cords were designed with the various angles of the safety idea definitely in mind. They contribute to safety in a number of ways in every mine or quarry where they are used.

Safe working conditions for men are of major importance. A properly designed and constructed cord is never a menace to those who must work with it. The high grade insulation and abrasion resistant "selenium rubber armor" of TIREX cords prevent dangerous leaks and short circuits.

Your production schedule should be safe from interference too. It is made up to meet definite requirements. If your goal is to be reached your equipment must produce as planned. TIREX cords are dependable insurance against cord failure interfering with production.

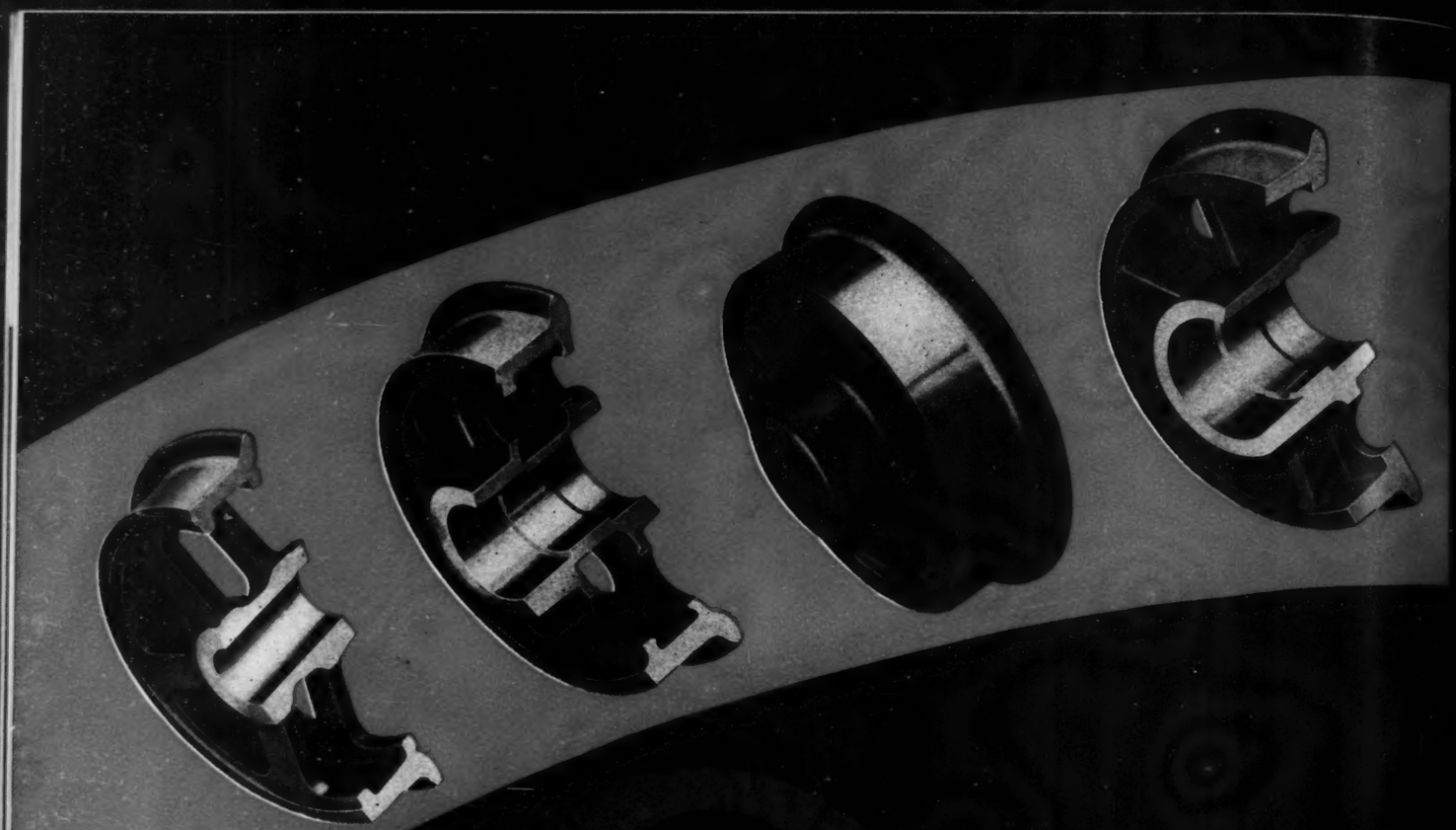
Flexible cords on drills and other portable electrical equipment are an important safety item. Maximum safety can only be maintained with first class, high grade flexible cords. They, too, must be protected from injury to enable them to do their full duty in safeguarding men and maintaining production schedules.

Simplex-TIREX cords are made for rough, tough working conditions. They are adequately protected by their "selenium rubber armor," an exclusive TIREX feature, and the toughest, most abrasion resistant rubber covering available for flexible conductors.

Simplex Wire & Cable Co., 79 Sidney Street, Cambridge, Mass.

Simplex-TIREX

The only cable armored with Selenium Rubber



you are going to buy Mine Car Wheels, two questions naturally arise
questions to which A.C.F. has BOTH answers. First: "Can I get ex-
the type of wheel I should have, designed and made to give greatest
?" The answer is: "YES—from A.C.F.". Second: "Can I get something
than ordinary steel when it comes to hardness of flange and tread, and
ing better than iron alone—wheels that will really reduce friction-
the rails?" And again the answer is: "Yes—from A.C.F.".


Remember then, a.c.f. facilities and experience, and the a.c.f. development of the epoch-making Improved High Speed Wheel Mixture (better than steel and better than iron for Mine Car Wheels) — and you will have the right answer to the question of better wheels and lower haulage costs.
AMERICAN CAR AND FOUNDRY COMPANY
New York • St. Louis • Chicago • Philadelphia • Berwick, Pa • Pittsburgh • Cleveland • Huntington, W. Va.

"WE CANNOT CONCEIVE HOW BEARINGS COULD BE MORE ECONOMICAL AND DEPENDABLE"

Says

WYATT COAL COMPANY

Tapered Roller TIMKEN BEARING EQUIPPED

A symbol of quality for any piece of equipment with which it is associated

Be sure and see the TIMKEN exhibit in the Metals Building at the New York World's Fair.

WYATT COAL COMPANY
MINERS AND SHIPPERS
BY-PRODUCT, DOMESTIC AND STEAM COALS
(OPERATING DEPARTMENT)
ESKDALE, WEST VIRGINIA

October 7, 1938.

The Timken Roller Bearing Co.,
Canton, Ohio.

Gentlemen:

Believing that you might be interested, we want to give ourselves the satisfaction of telling you of the service your product has rendered us.

Our number 2 mine first started operating in March 1931 and in this mine we now operate 350 mine cars manufactured by Kanawha Manufacturing Company and equipped with Timken Bearings.

Our condition is severe, the coal being transported a distance of 2½ miles with steep grades. However we have never experienced a single bearing failure.

With the results we have received, we cannot conceive how bearings could be more economical and dependable for mine car wheel service.

Yours very truly,

WYATT COAL COMPANY

L. W. Martin

Superintendent

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

Manufacturers of TIMKEN Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; TIMKEN Alloy Steels and Carbon and Alloy Seamless Tubing; TIMKEN Rock Bits; and TIMKEN Fuel Injection Equipment.

TIMKEN
TAPERED ROLLER BEARINGS

57 New Install

---- an increase of 76% over all prior

This is the phenomenal record of

CARDOX

'The Non-Explosive Mining Method'

THIS GROWING LIST OF USERS INDICATES CARDOX ACCEPTANCE

It is significant that 27 of these companies use Cardox in 2 or more of their mines

WEST VIRGINIA

American Coal Company of Allegany County
Bellwood Coal Company
Brule Smokeless Coal Company
Crab Orchard Improvement Company
Detroit Mining Company
Imperial New River Coal Company
Imperial Smokeless Coal Company
Island Creek Coal Company
Jamison Coal and Coke Company
Katherine Coal Mining Company
Kingston Pocahontas Coal Company
Koppers Coal Company
Pemberton Coal and Coke Company
Raine Lumber and Coal Company
Raleigh Wyoming Mining Company
Raymond City Coal and Transportation Company
Red Jacket Coal Corporation
Reppert Coal Company
Scotia Coal and Coke Company
Slab Fork Coal Company
South Side Company

WEST VIRGINIA

(Continued)

Truax-Traer Coal Company
Turkey Gap Coal and Coke Company
West Virginia Coal and Coke Corporation
Winding Gulf Collieries
Wood Coal Company

VIRGINIA

Blackwood Coal and Coke Company
Crystal Block Coal and Coke Company
Jewell Ridge Coal Corporation
Oakwood Smokeless Coal Corporation
Page Pocahontas Coal Corporation
Red Jacket Coal Corporation
Sycamore Coal Corporation

TENNESSEE

Tennessee Jellico Coal Company

INDIANA

Princeton Mining Company

lations in 1938

installations covering a period of 11 years

PENNSYLVANIA

Butler Consolidated Coal Company
Hillman Coal and Coke Company
Martin Mining Company
Pittsburgh Coal Company
Stony Springs Coal Company
Edward Tomajko

KENTUCKY

Ajax Coal Company
Creech Coal Company
Elkhorn Coal Company
Goose Creek Mining Company
Hart Coal Corporation
Millers Creek Coal Company
Harvey Coal Corporation
Knott Coal Corporation

ILLINOIS

Bell and Zoller Coal and Mining Company
Blue Bird Coal Company
Consolidated Coal Company (of St. Louis)
Mount Olive and Staunton Coal Company
Peabody Coal Company
Perry Coal Company
Wasson Coal Company
Franklin County Coal Corporation
Old Ben Coal Corporation

OKLAHOMA

Buck Creek Mining Company
Pocahontas Producers Coal Company
Premium Smokeless Coal Company
Starr Coal Company

WYOMING

Colony Coal Company
Kemmerer Coal Company

COLORADO

Boulder Valley Coal Company
Colorado Fuel and Iron Company
Consolidated Coal and Coke Company
Imperial Coal Company
Liley and Merlino
Louisville Lafayette Coal Company
McNeil Coal Corporation
Moffat Coal Company
Nu-Shaft Canon Coal Company
Wm. E. Russell Coal Company
Shamrock Coal Company
Temple Fuel Company
Vickers Coal Company

UTAH

Independent Coal and Coke Company
Liberty Fuel Company
Peerless Sales Company
Royal Coal Company
Spring Canyon Coal Company
Standard Coal Company
Uta-Carbon Coal Company
Utah Fuel Company

ARKANSAS

Great Western Coal Company

CANADA

Atlas Coal Company
Lethbridge Collieries Limited

Inquiries Are Solicited

CARDOX CORPORATION
BELL BUILDING — CHICAGO
307 North Michigan Avenue

SAFETY LIES IN *Skill*

1. Cut fuse squarely across with a sharp knife or cutting pliers. Be sure you cut it long enough: "A little more fuse is a lot more safety."

2. Seat freshly-cut end of fuse lightly but firmly against the charge in the blasting cap.

3. Crimp the cap securely about the fuse with the crimping pliers.

4. Use a wooden punch or the E. B. Center Punch to pierce the cartridge.

5. Insert blasting cap and fuse well into the cartridge so that the closed end of the cap is midway between the cartridge walls.

6. Tie fuse and cartridge together firmly with twine.

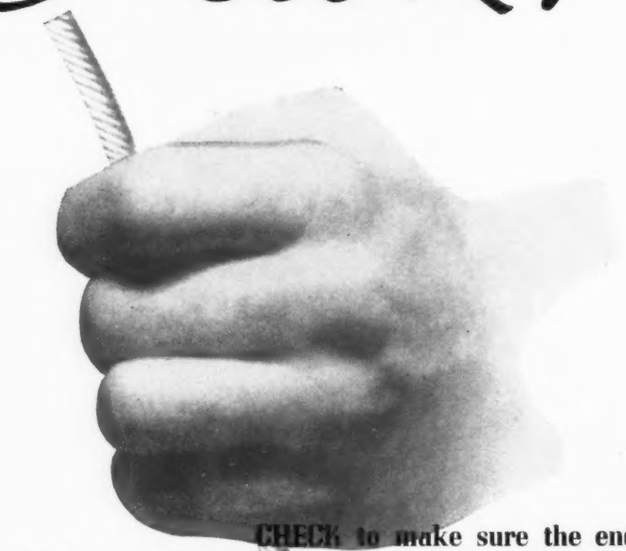
7. Push the primer cartridge into the bore hole, holding the fuse taut so that it is close to the side of the hole, where it will not be bent or injured by the tamping stick.

Ensign-Bickford

Makers of Cordeau-Bickford and Primacord-Bickford Detonating Fuse

SF84

Check!



CHECK to make sure the end of the fuse is *freshly cut* to remove any possibility of damp powder; *squarely cut* to insure good contact against the charge in the blasting cap. Make sure also that the cap itself is clean *inside*. Hold cap in place on fuse with index finger while crimping. These simple precautions are a sign of SKILL in preparing primers—and common sense in avoiding trouble.

Use the right kind of Ensign-Bickford Safety Fuse for each job.

THE ENSIGN-BICKFORD COMPANY
SIMSBURY :: :: CONNECTICUT

SAFETY FUSE